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EKO: ECONOMICS & ORGANIZATION OF INDUSTRIAL PRODUCTION

No 7, July 1987

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EKO: Economics & Organization of Industrial Production

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Gosplan Involved in Scientific Equipment Distribution

18200222a Novosibirsk *EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO)* in Russian No 7, Jul 87
pp 3-19

[Article by M. F. Zhukov, corresponding member of the USSR Academy of Sciences, deputy director of the Thermal Physics Institute of the Siberian Branch of the USSR Academy of Sciences (Novosibirsk): "Plasma Generators Being Distributed by...the Gosplan"]

[Text] Plasma generators have been given an extremely high honor. They are being distributed among the consumer enterprises by the USSR Gosplan itself! Does it mean that the demand for them is great if it is necessary to resort to such an extraordinary method of supplying production? Yes, the orders for them from industry are increasing. But it is not only this. Series production of plasma generators has not been organized and instead of planning their output the Gosplan has taken on the mission of distributing the small amount of plasma equipment that is manufactured by individual enterprises. Still, before speaking about the production of equipment for plasma technologies, let us turn to the technologies themselves and their capabilities since here lies the answer to the question of the interest in plasma equipment in various branches of the national economy.

Plasma processes occupy a leading position among the principally new technologies that are based on processing concentrated flows of energy. Even today there are more than 50 of them. An entire branch of chemistry has been formed—plasma chemistry, for which it is typical to have processes with an average mass temperature of the working gas of 8,000 to 10,000 degrees.

The majority of plasma technologies are based on low temperature plasma generators—plasmotrons. In this stage, they are the only devices that make it possible with a high heat efficiency factor (80-90 percent) to carry out continuous and regulated heating of gas to the given temperatures. The capacities of plasma generators that have already been developed now amount to from several kilowatts to tens of thousands of kilowatts. The sizes of these installations do not exceed tens of centimeters to a length of several meters.

Plasma technologies are most widespread in the chemical industry, metallurgy, and machine building. Modern metallurgical equipment, like, incidentally, many other kinds of equipment, has practically completely exhausted the possibilities of further increasing labor productivity. The traditional approach to improving it makes it possible to obtain only several percentage points of increase in labor productivity and we need several hundred. For example, according to calculations of economists, with a consistent increase in the volumes of blast furnaces from 1,033 to 5,000 cubic meters, the increase in their productivity has proceeded more and

more slowly and amounted to cubic meter of volume for 1.1 percentage points. (Footnote 1) It is time to resolutely turn away from traditional processes and change over to plasma and other principally new technologies for obtaining metal.

As we know, traditionally the process of reducing iron takes place in blast furnaces at a temperature of 800 degrees. In a plasma installation this takes place at temperatures that are several times higher. But with the increase in temperature there is also an increase in the speed of chemical reactions, which leads to a significant increase in the productivity of the equipment per unit of time and makes it possible to sharply reduce the sizes of the equipment for obtaining the same quantity of products and to reduce the production areas, that is, to reduce capital expenditures significantly.

Plasma metallurgical processes are becoming widespread abroad. Thus in Sweden the SKFStil firm has developed several processes that are based on plasma heating. Among them is the production of sponge iron and pig iron from iron ore pellets. The "Plazmared" process developed and patented by this firm has made it possible to increase the productivity of the metallurgical plant in Gofors from 25,000 to 60,000 tons a year. The Swedes have no coke for blast furnaces and their petroleum and gas is also imported. Plasma technology has enabled them to use for the process of reducing iron the least expensive fuel and energy resources, which have frequently even gone to waste—coal dust and wood chips. Many municipal agencies of Scandinavian countries are demanding that their firms change over to plasma methods of metal production since these are closed technological processes and, consequently, ecologically pure, while the traditional metallurgical technologies pollute the environment with sulfur and other harmful gases. Considerable capital investments are required to neutralize and purify them. In our country plasma metallurgy is being assimilated so far only at the Dnepropetrovsk Metallurgical Plant imeni G. I. Petrovskiy. This will hardly do.

There is one more circumstance that dictates the need to accelerate the development of plasma metallurgy: it makes it possible to utilize deposits that are poor in ore which are not promising from the standpoint of large-tonnage productions. Such considerations have forced us to resort to the so-called small-tonnage processes in the production of mineral fertilizers. Today nitrogen and phosphorus fertilizers are produced at large plants in our country since it is not advantageous to utilize small sulfur-acid and nitrogen-acid installations. Plasma methods make it possible to utilize the so-called marginal deposits in small-tonnage production.

Nitrogen-acid extraction of phosphorites is an effective method of producing fertilizers. Nitric acid can be obtained by the plasma method directly from the air. In order to provide, for example, Irkutsk Oblast with phosphorus fertilizers all one needs is a plasma installation

with a capacity of 10,000 kilowatts for processing the phosphorite deposits registered in the oblast. In Siberia they now apply several times less nitrogen-phosphorus fertilizers per hectare of land than they do in the European part of the country, and one-tenth the amount that is supplied in Western countries.

The Institute of Economics and Organization of Industrial Production of the Siberian Branch of the USSR Academy of Sciences has done calculations of the national economic effectiveness of the plasma chemical method of producing nitrogen fertilizers as an alternative to the traditional ammonia method. As an instrument for calculations they used the economic-mathematical model of the system of basic macroeconomic indicators of the national economy. In order to evaluate the effectiveness of the plasma chemical method they use the following assumptions:

- the scale of dissemination of technology—70 percent of the cultivated land planted in grain crops in the RSFSR could be fully supplied with mineral fertilizers produced by the plasma chemical method;
- along with the dissemination of plasma chemical technology there is a change of heat supply from small boilers that use hydrocarbon fuel to heat supply from technological plasma installations. Small boilers, as a rule, consume 25 percent more fuel than do TETs's and large modern boilers (Footnote 2) but in agriculture the overexpenditure of fuel is even greater by a factor of 2-3;
- as initial data they used capital investments for the construction of electric boilers and the production of nitric acid by the plasma chemical method and the labor-intensiveness of servicing the technology;
- by direct calculation they determined the labor resources released as compared to the ammonium method of producing nitrogen fertilizers, the savings on fuel and electric energy, and the reduction of the need for metal.

Accounting for all the interconnections of the national economic model showed that as the production of nitric acid by the plasma chemical method increases and the volumes produced by the traditional ammonia method decrease, there is an increase in the national incomes in amounts that exceed the need for capital investments for the development of the plasma chemical method by a factor of 8-21.

Small-tonnage production of mineral fertilizers directly in the places where they are utilized will make it possible to increase the intensiveness of farming. Moreover the kolkhozes and sovkhozes can have their own small plasma installations for their own production. It is not difficult to see that there will be a considerable reduction of transportation expenditures and railroad cars will be freed up. Local small-tonnage plasma installations can be operated during the night—during the period when there is a drop in the load of electricity networks.

Let us note a couple more important advantages of plasma processes. They are based on the fact that with high temperatures the reactions take place differently from the way they do in ordinary technological processes and that in plasmotrons with a closed process it is easier to provide the necessary purity and the required structure and properties of the materials. Therefore it is possible to obtain materials with new properties and principally new materials, including composite (multilayer) ones.

Researchers and engineers are showing a great deal of interest in various highly effective methods of applying to the surface of items hardening, heat-resistant, anticorrosion, protective, decorative, and other coatings, including by plasma dusting. They make it possible to improve the quality, increase the reliability and service life of machines and equipment, and improve methods of repairing and restoring worn-out surfaces. The method of plasma dusting has become firmly entrenched in machine building, energy engineering, aircraft construction, electronics, and other branches.

One can give as an example the possibility of reducing the colossal energy losses in water transportation because of the protective, wear-resistant coatings on the blades of propellers. They are necessary in order to reduce the destructive influence of cavitation (microexplosions on the surface of the propellers) and to protect from the abrasive effects of solid particles in the river and sea water. When ordinary steels are used, by the end of the navigation period the pulling characteristics of the propellers are reduced by 7-8 percent. In order to increase resistance to wear and tear, the blades are usually manufactured from nonrusting steel. The Novosibirsk Institute of Water Transportation Engineers in cooperation with the Institute of Thermal Physics of the Siberian Branch of the USSR Academy of Sciences and the Tulachermet Scientific Production Association have chosen another way. They suggested a technology for plasma dusting of a special wear-resistant powder on the blade of the propeller. Using this way to strengthen propellers manufactured from inexpensive carbon steel serves several times longer than propellers made of the best alloy steel.

The problem of resistance of materials under extreme conditions is especially crucial for regions of Siberia and the North. It is known that just because of the fact that the technical equipment and materials are not suitable for the severe climatic conditions, the national economy annually sustains losses measured in the hundreds of millions of rubles. The fact is that at temperatures less than -40 degrees, which are typical of many northern regions (including in the zone of the Baykal-Amur Mainline), there is a sharp increase in the number of malfunctions of technical equipment, there are more accidents on petroleum and gas lines, and drilling installations are halted more frequently. It is possible to reduce unjustifiable idle time and large expenditures and to prevent the growing losses (one must not forget the zone of assimilation in the northern territories is expanding each year)

if when creating new materials one relies on revolutionary technologies. Equipment manufactured from these materials will be capable of operating reliably under extreme conditions.

The technology for plasma dusting of hardening and protective coatings can exert an immense influence on the metal-saving policy in the national economy and the reduction of labor- and capital-intensiveness. As a result of its application when creating new machines one provides for increased reliability and durability of technical equipment, and it is also possible to make all components and parts equally durable and resistant to wear and tear and considerably reduce or completely eliminate intermediate repair of equipment. The durability of parts restored by this method increases by a factor of 2-3, and those that are operating in aggressive chemical environments—by a factor of 15-20.

The technology of plasma dusting is widespread abroad because of the fact that during the past 5-7 years they have created a new generation of automated plasma equipment that is equipped with systems for monitoring and stabilization and control of technological parameters. This equipment can be used in combination with robot manipulators and makes it possible to create flexible robot equipment complexes for mass production of components and parts for machines. Great possibilities of automating plasma equipment are associated with the fact that the heating element in plasmotrons is a practically inertia-less electric arc. Hence the small degree of inertia of the technological process and the reliable direct and reverse ties that contribute to automation of the control of it.

The plasma mechanical method of processing metals is the most promising in machine building. It is effective for processing large blank pieces made of nonrusting steel and other materials that are difficult to process as well as parts with wear-resistant coatings on the surface.

Plasma arc technology can be used successfully for cutting steel sheets with a thickness of up to 250 millimeters and nonferrous metal sheets up to 100-150 millimeters. So far in world practice there are no reliable air-plasma installations for cutting sheets of greater thickness. This is retarding the development of plasma mechanical processing of materials. In order to solve the problem it is necessary to increase the working current of the electric arc in the plasmotron to 800-1000 A and the length of service of the cathode component. The Institute of Thermal Physics of the Siberian Branch of the USSR Academy of Sciences has submitted a plan for such a plasmotron which satisfies practically all the requirements for current and service life. This opens up extensive possibilities for increasing the speed of processing metal.

The next large area of plasma technologies is coal gasification. In the near future a considerable proportion of the organic fuel consumed by the country's industry will

be mainly brown and rock coal from Siberia and Central Asia with a high content of ash and sulfur, which can lead to significant pollution of the environment. The Berezovskaya GRES of the Kansk-Achinsk Fuel and Energy Complex alone will, according to preliminary calculations, discharge about 100,000 tons of sulfur oxides, 70,000 tons of nitrogen oxides, and almost 20,000 tons of ash, that is, more than 500 tons per day. In this connection it becomes even more crucial to create waste-free technologies for comprehensive processing of low-calorie coal into high-calorie fuel. Specialists link the appearance of the new "coal era" to the development of highly effective plasma processes for processing coal, the results of which will be a product for the chemical and metallurgical industry, motor and other kinds of fuel, and for burning gasified coals in the furnaces of TETs's and GRES's.

The small sizes of plasma equipment, the possibility of complete automation, and the lack of discharges of ash, sulfur compounds and other harmful substances into the environment make the method of plasma gasification of rock and brown coal, shales, and peat extremely promising.

Intensive research on coal gasification is being conducted abroad by the AVCO firm which has suggested a method of obtaining acetylene by hydrolysis of coal in plasma. The firm asserts on the basis of economic calculations that the acetylene obtained this way can compete with ethylene as the initial product for producing polymers.

At the plant in Gofors (Sweden) that was already mentioned in this article, where they produce blank steel pieces, they put into operation the first installation for plasma chemical gasification of coal in the world, which operates on a 50-50 mixture of coal and water. Technological processes for plasma gasification of coals are being developed intensively in Japan, the United States, the FRG, and other countries, and plasma gas generators with small capacities have been suggested for industrial utilization in the United States.

The rapid development of many branches in modern industry have brought into the foreground the problem of efficient utilization of production byproducts. Existing methods—burying wastes in the ground, burning them or putting them under water—frequently are still dangerous to the environment and they are extremely capital-intensive. Add to this that the wastes also contain an immense quantity of valuable raw material.

Among the most effective measures for complete salvaging of chemical wastes one can name the plasma chemical method which provides for processing any wastes into a stream of low-temperature plasma (hydrogen, steam, or other). At a high temperature there is a decomposition of any wastes into elements with a subsequent synthesis of

products. Waste-free and reduced waste technologies are directed toward a strategic solution to the problems of efficient utilization of natural resources and protection of the environment.

And, finally, the plasma jets are used for lighting and stabilizing the burning of coal dust fuel in furnaces of electric power stations. The plasma method applies for igniting the fuel with smaller expenditures of energy, and economizing on fuel oil and gas (utilized in traditional burners) and it simplifies the entire system of lighting. It should be noted that more and more attention is being devoted to the problem of applying plasma generators for these purposes in the United States, England, Japan, Canada, and China.

Experiments have been conducted in the United States in lighting a boiler beginning when it is cold, using plasmotrons at the capacity of 109 kilowatts instead of fuel oil burners. The comparison of the energy indicators of the traditional and the plasma methods for igniting coal dust showed that the plasma method is 6 times more economical.

The economic effectiveness of plasma stabilization of combustion for electric power stations of Kazakhstan for the capacity of an energy block of 300 megawatts is about 500,000 rubles per year.

Through the efforts of Soviet scientists we are solving the important problem of using plasma installations for starting up gas turbine engines at gas pumping stations that operate on natural gas. Under the conditions of the North and Siberia, it has always been necessary to try many times to start up engines at low temperatures, which leads to large losses of gas and pollution of the atmosphere. Specialists of the Nikolayev Shipbuilding Institute and scientists of the Institute of Thermal Physics of the Siberian Branch of the USSR Academy of Sciences have developed a gas jet plasma igniter that provides for reliably starting up a gas turbine engine using natural gas.

When evaluating the economic effectiveness of plasma technology, one takes into account the following important peculiarities: the growth of labor productivity; the reduced-waste or waste-free production; the lack of negative influence on the environment because of the closed nature of the process; the reduction of the expenditure of metal because of the miniaturization of equipment; the built-up area and the savings on land; the reduction of capital expenditures and the rapid return on capital investments; the combination of the utilization of plasma chemical technology depending on the load of the energy networks—saving on electric energy during "peak" hours; the possibility of obtaining new materials and materials with given properties, which is of immense significance for machine building, aviation, space and electronic equipment, and for effective utilization of equipment under extreme climatic and operational conditions.

But we cannot yet say that plasma technologies have occupied the position in the arsenal of modern production processes which they should occupy, although both researchers and engineers are displaying undoubted interest in them. What is holding up their development? It is now appropriate to turn to the discussion of plasma equipment. Nobody wants to take on its manufacture and, the main thing, neither the State Committee for Science and Technology nor the Gosplan is trying to determine the enterprises for its series production. The Ministry of Petroleum and Chemical Machine Building makes 150 installations a year, mainly for itself. This is a drop in the bucket on the scale of the needs of the national economy. A certain number of plasmotrons are manufactured by the Ministry of the Automotive Industry and the Ministry of the Aviation Industry, which are fairly successfully developing the processes of plasma dusting and plasma mechanical processing and cutting of materials.

It is impossible to understand why nothing is being done by the Ministry of the Electrical Equipment Industry and the Ministry of Power Machine Building whose enterprises, along with the Ministry of Petrochemical Machine Building, in terms of their specific features are closest to the production of plasma generators. Branch science and design organizations are standing on the sidelines. This is why the chain of "fundamental research—development—series production" has been broken.

For 20 years our institute has been conducting fundamental research on processes of heat and mass exchange and the interaction of the electric arc with gases and magnetic fields. The results we obtained were the basis for creating plasma technologies and developing equipment. We have our own fairly good laboratory experimental base and some of our developments are being realized by the experimental plant of the Siberian Branch of the USSR Academy of Sciences. We have also been lucky with our partners in creative cooperation—the Energokhimash Special Design Bureau and the Siberian Branch of the Tekhnergokhimprom Scientific Production Association. Our example is one of a few in which the idea of a belt of introduction around the Siberian Branch of the USSR Academy of Sciences has justified itself. Along with these partners and certain other organizations we have developed designs for plasmotrons and multi-arc plasma chemical reactors for processing liquid and gaseous products and for obtaining ultradispersion powders, applying protective coatings, destroying harmful production wastes and processing them into useful products, for plasma mechanical processing of metals and other technological processes. In terms of their most important indicators certain designs surpass analogous foreign models. Individual developments are already being applied or are being assimilated.

They include:

- a microplasmotron with a capacity of 1 kilowatt intended for cutting capron, silicate and other fabrics, thin sheets of metal, welding, and other operations;
- a universal electric arc plasmotron of the EDP-104 type with the capacity of up to 50 kilowatts (it is used for multi-arc plasma chemical reactors);
- the EDP-109/200 plasmotron with a capacity of up to 200 kilowatts (it is used at enterprises of the Ministry of Nonferrous Metallurgy and other branches of the national economy);
- the GNP-1.5 hydrocarbon plasmotron with a capacity of 1,500 kilowatts (it is used in the chemical and metallurgical industry).

The whole problem is that it is necessary to wait too long for introduction. This is always fraught with the danger of inefficient utilization of the scientific and technical potential that has been accumulated. For several years now one of the European firms has been conducting negotiations with us concerning the purchase of the license for plasmotrons for metallurgical production. Plasma equipment with small capacities has attracted the attention of Japanese companies. We are refraining from the sale of licenses assuming that sooner or later we will begin series production of the plasmotrons for the national economy. At one time it was suggested that this be entrusted to the Kurgan Plant for Equipment and Chemical Machine Building. Negotiations concerning this were conducted with the branch for several years, but so far they have not produced any concrete result. **Instead of engaging in the distribution of the small amount of plasma equipment that is now being produced in the country, the USSR Gosplan should earmark its manufacturers.**

Plasma generators are not simply equipment. It is necessary to have experience in their production and knowledge of the fine points of technology. And this is possible only at a specialized enterprise. The fact that now everyone who is developing plasma technologies must create his own equipment for them is a serious impediment. The more so since there are still many complicated scientific and technical problems which cannot be solved by the consumers. They must receive ready technology and equipment for its realization.

One of the most pressing problems is that of automating plasma equipment and technology. For example, in terms of the level of many plasma processes in machine building and the special functions of equipment, our country is at the world level, but it is considerably behind in terms of automation and robotization. The Ministry of Instrument Making, Automation Equipment and Control Systems, the Ministry of the Electronics Industry, and the Ministry of the Electrical Equipment Industry have not yet engaged in the solution to the problems of automation.

Among the problems in the utilization of plasma technologies people include their energy-intensiveness. But the restructuring of the country's fuel and energy balance that is linked to the need for economizing on kinds of fuel that are in short supply leads to a considerable increase in the proportion of electric energy. And this, in turn, makes it necessary to give priority development to technological processes that are based on electric energy as the universal energy bearer. Enterprises that utilize plasma technology can regulate the load on energy systems and contribute to their operation under variable conditions.

The next problem is associated with the requirement for stability and reliability of operating equipment (plasmotron, system for its gas, water and electricity supply, and so forth) in combination with the system of monitoring and control of the parameters of plasma installations. The new generation of plasmotrons offered by the Institute of Thermal Physics and the Energokhimmash Special Design Bureau meets these requirements to a considerable degree. As a result of fundamental research we managed to create plasmotrons with a service life that meets the requirements of industry, high energy of plasma streams, and a high heat efficiency factor. Their service life has been increased by a factor of 4-5 as compared to installations of the preceding generation. The developments of the installations of the Energokhimmash Special Design Bureau successfully realized the module principle—from standard modules it is possible to construct a plasma generator of any capacity.

Our institute has developed extensive theoretical and experimental work in thermal physical and hydraulic gas dynamic processes that arise during plasma dusting. A multipurpose automated experimental stand has been created for checking the reliability of plasma equipment and comprehensively diagnosing high-temperature gas streams of complex composition, processing technical means and developing program support intended for control of the process of dusting using microcomputers.

Plasma technologies are experiencing a turning point. There is a clear-cut materialization of fundamental research. A similar tendency was also noted during the International Symposium on Plasma Chemistry that was held in 1985 in the Netherlands. In France, the United States, Canada, the FRG, Sweden, Great Britain and Japan a large program of work has been carried out for developing plasma chemistry and plasma equipment, including research and development of processes and equipment, personnel instruction, and training of permanent personnel. Commercial plasmotrons with megawatt capacities have been created and work is being done to create plasma generators with capacities of 20-40 megawatts. The main areas for the application of these plasmotrons is blast furnace and steel smelting production where there is a significant savings on coke when reducing iron and obtaining ferrous alloys.

At the symposium a great deal of attention was devoted to processes of plasma gasification of coal. Among other areas of application of thermal plasma they consider processes of smelting, pickling, polymerization, the production of powders, and the synthesis of solid particles of a given composition.

Thus electric arc plasma generators have become commercially acceptable and available, and the impressive successes of microprocessor and measurement equipment make it possible to create highly effective plasma installations for various purposes on the basis of these. There is no doubt that plasma technologies are a real force in increasing the effectiveness of production and accelerating scientific and technical progress.

Footnotes

1. Calculations were done in the Institute of Economics and Organization of Industrial Production of the Siberian Branch of the USSR Academy of Sciences.

2. Lalayants, A., "Problems of Economizing on Fuel and Energy Resources in the National Economy," *PLANO-VOYE KHOZYAYSTVO*, No 1, 1981, p 40.

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New Generation of Equipment Described
18200222b Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 7, Jul 87 pp 14-17

[Article by Yu. V. Kurochkin, doctor of technical sciences, Professor of the Plant-VTUZ at ZIL, State Prize winner (Moscow): Processing With Concentrated Flows of Energy—A New Generation of Technology“]

[Text] In recent years technological processes associated with direct utilization of directed energy currents and physical fields have become more and more widespread. Laser and plasma-art hardening, welding, plasma and detonation dusting of coatings, electronic ray and ion-vacuum processing, ion implantation, electric impulse hardening and plastification—these technological processes for treating with concentrated flows of energy (OKPE) make it possible to solve in a new way problems of reducing energy- and metal-intensiveness, expenditures of materials that are in short supply and improvement of the characteristics of items, and to raise the level of automation of production and labor productivity.

The utilization of flows of plasma and charged electromagnetic particles laid the basis for a whole number of large independent technological areas such as plasma chemistry, laser chemistry, and synthesis of materials

with given properties. In machine building and metal processing alone the possible list of these technologies already includes more than 150 processes.

The Basic Directions for the Economic and Social Development of the USSR During 1986-1990 and the Period Up to the Year 2000 Sets the Following Task: "To Provide for Extensive Introduction Into the National Economy of Principally New Technologies—Electron-Ray, Plasma, Impulse...." A typical feature of these technologies is the general principle of operation of equipment—direct transformation of electric energy into energy for a technological impact and the similarity of this impact which is based on structural-phase or atom-molecular transformations in the processed material.

Let us consider the basic peculiarities inherent in the majority of kinds of OKPE technologies.

A high concentration of energy which is introduced into the zone of technological impact, the local nature, and the precision (finesness) of processing with significantly smaller total energy expenditures. As a result of this one achieves miniaturization of equipment and it becomes possible to combine various kinds of thermal, chemical, mechanical, magnetic and other kinds of processing in one technological cycle or even with one installation of a part.

The small degree of inertia of the processes, which is a result of the direct transformation of electric energy into energy for the technological impact (without intermediate mechanical stages), the practical lack of an instrument and, consequently, the lack of wear and tear on it, and also mechanical (dynamic) contact with the processed part provides for mobility in control and the possibility of deep regulation of the conditions for processing in combination with simplicity of positioning and attaching the parts. This peculiarity opens up broad prospects for effective utilization of OKPE technology in such progressive forms of modern equipment as processing centers, rotor lines, robot equipment complexes and flexible automated systems based on microprocessor equipment and adaptive control computers.

The possibility of directed modification (change) in the properties of the surface layer makes it possible to solve one of the most important problems at a qualitatively new level: providing for an optimal ratio between the properties of the surface and the volume of the material. It is known that practically all processes that lead to failure of items—wear and tear, corrosion, increased sizes of fatigue cracks—begin with the surface and are determined with the properties of a relatively thin surface layer. The OKPE technology offers an extremely broad spectrum of possibilities for impacting these properties, from macromethods (plasma dusting, laser application and alloying) to microimpact on the crystalline

structure of the material at the atomic level (ion implantation). Because of this there are greater possibilities of solving the fundamental problem of machine building—increasing the reliability and durability of parts and machines.

EKO has written about the introduction at ZIL of processes of laser hardening of the head and liners of cylinders, instruments and so forth (Footnote 1). In order to store parts, at the automotive plant they use electronic ray technology. They have also mastered hardening by methods of plasma dusting.

Scientific and technical progress in machine building is largely linked to the application of new, highly durable, heat-resistant, corrosion-resistant, difficult-to-process materials based on powder and complex (composite) materials, ceramics, plastics and so forth. OKPE technology is the one that is most effective and, in a number of cases, the only possible one for processing and obtaining the aforementioned materials. It is no accident that in the Comprehensive Program for Scientific and Technical Progress of the CEMA Countries Up to the Year 2000 the tasks in the area of creating new materials and methods of processing them, including OKPE, were formulated as organically interconnected in the overall section "New Materials and Technologies for Their Production and Processing."

A typical stage of the modern state of OKPE is the accumulation of the results of technological experiments and experimental industrial assimilation. The output of specialized equipment and personnel training have not yet been started on a sufficiently large scale. This causes alarm because the realization of the innovations can be delayed.

The rapid growth of science-intensive technologies in general and OKPE in particular, which has been noted in all industrially developed countries, shows that the assimilation of these progressive technologies is a long-term tendency that is determining the development of world industrial production. In order to accelerate the large-scale introduction of OKPE there is a persistent need for comprehensive and intercoordinated solutions to the following problems:

the development of a general approach from unified positions to the entire spectrum of technologies that utilize directed energy flows and physical fields, the determination of a standard list of processed materials and parts, and the concretization of the areas of most effective application of one technology or another, and also the possible combinations with other methods of processing;

deepening and expansion of scientific research with the development of the results to the point of technological recommendations and the development of methods of economic accounting and prediction of the effect of OKPE;

the development and creation of technological equipment and fittings;

the formation of engineering personnel with in-depth physics and mathematical training necessary for working with OKPE technologies.

The solutions to all the aforementioned problems involve certain difficulties because of their multibranch nature. But they are necessary since the success of the introduction into production of one of the most promising classes of technologies of the new generation will largely depend on this. OKPE technologies require tension and support from the State Committee for Science and Technology, the USSR Gosplan, and the Presidium of the USSR Academy of Sciences.

Footnote

1. Mulchenko, B. F. and Fishkis, M. M., "Assistance in Promoting This Instrument Which Does Not Wear Out," EKO, No 1, 1987.

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Good Management Essential to Enterprise Recovery

18200222c Novosibirsk *EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 7, Jul 87*
pp 20-33

[Article by S. A. Manukyan, general director of the Cotton Combine (Tiraspol, Moldavian SSR), now minister of light industry of the Moldavian SSR: "Management Activity"]

[Text] The Tiraspol Cotton Combine has a complicated biography. Constructed in the 1970's, it was for a long time one of the backward enterprises with all the consequences that ensue from that: high labor turnover, failure to fulfill planned assignments, poor product quality. The situation changed when the new director came. The fate of the cotton combine again confirms how much can be done by a competent manager with initiative who persistently conducts measures for bringing the enterprise out of its slump. At the cotton combine they include, first and foremost, improvement of the organization of production and management, consistent accounting for the interests of the workers in production and outside of it, and the formation of a collective of like thinkers.

The selection is devoted to these aspects.

A couple of years ago when the backward collectives were listed our association was almost the most "popular." At meetings of the party and economic aktiv the enterprise management was justifiably subjected to

severe criticism for failure to fulfill production assignments, labor turnover and the low level of discipline. When an enterprise does not fulfill its assignments for a long time there should be serious reasons for this. In our association, at first glance it did not seem that such reasons existed. Its shops had been constructed recently, according to a sufficiently intelligent plan, and they were equipped with modern equipment. Production was based on progressive technology and the raw material was no worse than that of others. So what was the matter?

It happened that the first successes in the assimilation of production capacities concealed shortcomings in management, labor organization and education of the collective that were not as significant as was initially thought. But these shortcomings, like a snowball, grew into new and more significant ones. Down time on machines and tools became part of the system and labor productivity dropped sharply. Labor turnover, absenteeism, and other violations of labor and technological discipline became constant problems. Both the sewing factories and trade considered the enterprise to be an unreliable partner. The indebtedness to the state for producing fabrics increased from month to month. The chain of small omissions became the cause of individual interruptions. They became chronic and began to be perceived as something inevitable.

Having studied the state of affairs in detail, we came to the conclusion that the root of all the problems lies in the lack of activity in management. When order was brought into this important area we began to correct the mistakes that had been made and to unravel the knot of confusion thread by thread.

Even during 1920 one of the initiators of the movement for scientific organization of labor, P. M. Kerzhentsev, set forth simple and clear-cut requirements for management activity.

Instead of spontaneous work—precise accounting
Instead of one way or another—a well-thought-out plan
Instead of somehow or other—a scientific method
Instead of sometime or other—on 15 October at 8:35 p.m.

Essentially, these are the ABC's of business efficiency. But life shows that they do not become the property of the workers automatically, of their own accord. They must be not simply assimilated, but made a feature of character, a habit. Alas! In practice one still fairly frequently encounters laxity, incompetence, and a disrespectful attitude to one's immediate duties. In my opinion, this causes many of the problems in modern production. Economic knowledge is certainly not the same thing as economic thinking. And without developing the latter among the broad masses of workers we will not achieve real business efficiency or socialist enterprisingness.

How To Increase Business Efficiency

All the work for increasing business efficiency was based on the principle of the strictest monitoring of the implementation of decisions, orders and decrees. **We took the path of creating an efficient control system.** It was actually a system, for the episodic nature of checking on implementation, as a rule, ends up to be simple registration of omissions and mistakes. But the problem is to monitor the most important constituent part of the daily organizational work of each economic manager.

Special attention was devoted to keeping minutes of all kinds of meetings and conferences. It became mandatory to indicate in them the specific people in charge and the time periods for implementing various measures. But far from everybody accepted even this simple policy immediately. Approximately a week after the first production conference was conducted in the new way, it turned out that almost no changes had taken place. Many specialists continued as before to try to conceal their personal inactivity behind a shield of "objective" factors. Then it was necessary to warn everyone that personal monitoring would be introduced for engineering and technical personnel. And this means that with respect to certain workers coefficients of negative "stimulation" would be applied.

When the question was put point-blank many became more efficient. And those who could not or did not wish to change had to give way to the more capable workers. Thus the council of directors voted in favor of firing the former chief of the sales division. This post was taken by a young specialist and he soon arranged efficient product sales in keeping with the plan.

The enterprise standard, "The Policy for Monitoring Expeditionary Action" introduced in 1981 contributes to increasing efficiency. It establishes the policy for implementing orders and instructions and also envisions material incentives taking into account the quality of the assignments that are performed. All orders, instructions, and decisions of the conferences under the general director and the head engineer are sent to the department for quality control where they are accounted for. After registration they are entered on a control card which is sent to the worker. The stub of the control card is put into the slot of the card catalogue that corresponds to the time period for implementation. If the fulfillment of the assignment requires a longer time, the performer must coordinate this extension with the manager of the enterprise or notify the quality control department of this.

When the assignment has been fulfilled the worker signs the control card and turns it into the quality control department. The engineer of this department verifies the fulfillment of the assignments and each month draws up a summary of the assignments that have been carried out, calculating the coefficient of the quality of the labor of the basic workers. If the measures have been fulfilled after the established time period, or with poor quality the

coefficient of labor quality is reduced by 0.1 for each of these parameters. With early and high-quality performance of the assignment the coefficient of labor quality is increased by 0.1, correspondingly, for each overfulfilled assignment. The coefficients are considered by the technical council and are approved by the general director of the association. If during a month the coefficient of labor quality of engineering and technical personnel is below 0.5, according to the provisions he is demoted. Thus two of my deputies left the enterprise because their coefficient of performance of assignments was 0.3. It should be noted that we reduce the coefficient for failure to fulfill the assignment even because of factors that are objective from the standpoint of the worker. This reduces the desire always to be referring to objective factors.

The introduction of the standard made it possible to sharply increase the responsibility of the executives for the matters entrusted to them. Thus while previously the coefficient of labor quality amounted to an average of 0.6, according to the figures for the first month of work with the standard being applied it increased to 0.85 and now it exceeds 0.95. The mechanization of the transportation of yarn in the spinning shop of the first yarn and fabric factory can serve as an example of the effectiveness of the introduction of this standard. For several years this was a bottleneck in production. But when the decision that was made was strictly monitored and each worker felt that he could not escape his responsibility, all the problems were solved precisely at the appointed time.

We see the main thing in that the matter is not left to its own accord and is not made dependent on the unstable moods of the workers. And I shall not try to hide the fact that it is nice to see that there are fewer and fewer workers in the collective who are capable of forgetting, confusing, and distorting everything you entrust to them. It has become possible to anticipate and promptly eliminate various kinds of "shock" situations. The administrative staff itself has begun to work more rhythmically and in a more coordinated way.

When beginning to take measures for improving the structure of management we recognize that the key figure in production is the foreman. It was this category of managers that required increased attention. Previously the role of foremen at the combine was reduced to nil: he almost did not intervene in the course of the production process, not paying attention even to interruptions in it, and he had nothing to do with thefts and other violations of discipline. Frequently the foreman was a person who did not work out well at the machine tool. First of all it was necessary to increase his role in the eyes of the working class. We considered all the candidates for the position of foreman and eliminated those who had neither experience nor knowledge. Even externally we tried to emphasize their role at the enterprise. Today the offices of the foremen as well as those of other managers are not very different from the office of the director.

Competition: To What Are We Going?

Competition has become the specific method of management at the enterprise. It will not be original if I say that we see our task in combining competition with management and the initiative of the masses with planned development of business. Yes, we need the people's creative enthusiasm. Without this it is impossible to solve the problems of the five-year plan. But it would not hurt to recall during the bustle of our work day that for V. I. Lenin the word "competition" usually was preceded by the word "organization." To channel the energy of mass research in the direction of the party economic policy also means to work in a Leninist way and organize competition correctly.

This matter is now approached formally, as a rule. How many times have we adopted socialist commitments? Is it always possible to explain why one or another set of figures were adopted? Why do the commitments adopted by various shops of the same technological chain not fit together? Why, having made a commitment to save 300 tons of raw material, do we do something else—produce 1 million meters more fabric? And with the same amount of success one can also save 10 million! It is my conviction that this is primarily because we have not developed theoretical foundations for the competition or methods for conducting it.

I think that the competition should be directed toward the achievement of the highest results on the basis of the achievements of scientific and technical progress. If the Cheboksary Plant were to make a commitment to produce machine tools not with 240 revolutions per minute, but 400, 600, 800...and we, when assimilating this new technical equipment, could show our labor breakthrough! All the power and all the might of the competition would be directed toward technical progress and technical creativity. Since 1986 we have changed over to waste-free production and individual shops. We made a commitment for the 12th Five-Year Plan to completely change the enterprise over to these working conditions. We are now waiting for rotary equipment. This is interesting work!

For our association, which is faced with the most crucial task of overcoming arrears, one of the most important questions has been strengthening the interconnection between competition and elements of cost accounting. The basic task has been, on the one hand, to have cost accounting strengthen the competitive processes within all the subdivisions and among them and, on the other, to have the development of the competition contribute to deepening cost accounting and increasing its effectiveness. Accounting for product output in terms of technological categories and orientation toward the final result have helped us.

One must not think that all this has been painless. It has been necessary to hear serious reproaches, including for adventurism. We were helped in standing our ground

and not giving up by our conviction that we were right based on practical experience: as early as 1971 I had worked at an enterprise where payment was made according to the final result: if they have sent the products to the warehouse all the workers receive what they have earned, from the scutchers to the packers.

It seems simple. But what great possibilities there were of impacting production: judge for yourselves. Say that one ton of cotton comes in for production. The output of yarn according to the normatives should be 85-86 percent. Before the introduction of the new forms of payment for labor this result was never achieved, and they received about 200-250 kilograms of yarn. Now we give the shop a ton of cotton and the workers know that they must produce 850 kilograms of yarn for otherwise it will have an appreciable effect on their earnings. If they have produced 985 kilograms the difference goes for incentives for the brigade. The same thing happens further along the technological chain. While in 1980 400 tons of defective yarn lay in the warehouses, now there is none at all. The workers cannot allow themselves such a luxury.

Management Influence—Through the Brigade

One of the basic tasks of management is to increase the responsibility of the workers. A lever that makes it possible to approach this goal is brigade organization of labor. In order for the introduction of the brigade form of organization and stimulation of labor to be carried out more expediently and in a more planned way, and if also in order to generalize the experiences in this area, the association has created brigades consisting of management workers of associations to which specific factories and divisions have been assigned. These brigades include workers of the division for the organization of labor and wages, the planning and technical divisions, the bookkeeping office and the division for scientific organization of labor. Reports are heard from these managers at meetings of the commission for introducing collective forms in the association.

We preliminarily study the experience in introducing the brigade form of organization and payment for labor at enterprises of other branches of industry. Their experience and ours make it possible to draw the following conclusions.

The main condition that determines the expediency of the organization of brigades is the degree of interdependency of the future members of the primary production collectives. This is equally important for both specialized and comprehensive brigades. If the successful work of certain workers does not depend on others, these brigades will not last long. This is why we have carefully studied all aspects of present and future labor activity of workers who are to be included in brigades.

An efficient type of brigade was selected on the basis of a comprehensive analysis of the production and technical conditions of the section under investigation, and its occupational composition and qualification structure was calculated. Then we determine the optimal economic, psychological, and physiological limits for the division and cooperation of labor. Upon completion of the preparatory work at a general meeting of the section the workers were familiarized with the proposed program of organization and payment for labor and the policy for distributing earnings. **We were convinced that the observance of the principle of voluntary participation when forming the brigade was the guarantee of the success of the labor activity.**

In order to improve the new method of labor organization, consolidated brigades were formed from the textile workers by combining two, three or four complexes in all production sections. Such a comprehensive brigade services from 100 to 296 machine tools. In the preparatory shops for spinning production the new brigades join together workers who service machines in several subsequent sections (conveyor, combing, flattening). The technological principles of collective labor are observed in individual production as well. In the majority of cases shift or comprehensive brigades are created, that is, workers of several occupations are joined together. This has made it possible to achieve flexibility in the work when certain members of the brigade are absent.

The brigade form of organization and payment for labor according to the final results demanded a higher level of management of production and planning and economic work at the enterprise. The connection between the labor of an individual work and the final results of the activity of the brigade and the plan of the enterprise became more appreciable, especially in brigades working on cost accounting. Each brigade is given a production plan which envisions indicators for volume in physical terms. The plans of the brigades are directly and immediately linked to the plans of the section, shop and enterprise. For example, the plan of the weaving shop is the sum of the plans of the brigades of weavers, and the plan of the brigade of weavers is the sum of the plans of individual workers.

In order to exercise control over the implementation of plans, operational accounting was established—daily, weekly, and also as a running total for the month, quarter, year and various years of the five-year plan. The evaluation of the results of the fulfillment of brigade plans is done by comparing with indicators adopted in the plans. The accounting for the fulfillment of brigade plans does not rule out monitoring the fulfillment of the assignment by each member of the brigade in order to evaluate his personal contribution to the overall result of the work. This accounting is done on the basis of bookkeeping figures or by the brigade leaders.

The brigade production plan is a principally new labor indicator that reflects the individual capabilities of workers and stimulates their achievement of high productivity

since the wages of brigade members depend on the final result of the entire brigade taking into account the personal contribution of each. Planned assignments were submitted to the brigades at the basic shops before as well. But this plan is based on the output norm which, as a rule, is 5-10 percent lower than the planned productivity, and the production plan was based on the productivity of equipment indicated in the design documentation. This stimulated mainly the fulfillment and overfulfillment of the individual output norm. In our enterprise this led to a unique situation: the workers were fulfilling and overfulfilling the output norms but the enterprise as a whole did not fulfill them. With the introduction of the brigade form the level of norm setting for labor was raised, which made it possible to establish production plans for the brigade on the basis of the planned productivity of the equipment proceeding from the plan for the sections and shops of the factories.

The organization of wages is the final stage in the creation of the system of brigade organization of production but it is perhaps the most responsible of all those that comprise this system. The development and approval of brigade production plans has required a radical change in material incentives for workers. **Wages according to individual indicators have been replaced by a collective system of wages and bonuses for the overall result.** Thus bonuses in all brigades of the basic shops are paid for the fulfillment of the plans of the brigade in terms of physical and quality indicators.

The desire to bring wages in line with the work that had been done led to the development of the various kinds of additional payments. Additional payments are paid to 660 people for combining occupations. Additional payments are differentiated: thus workers and junior service personnel are paid up to 50 percent of the wage rate in their basic job. Additional payments are made to 550 workers of the basic occupations who are employed in the repair of equipment on the basis of the provisions concerning establishing increments for high professional mastery and for especially responsible work. Piece rates have been increased by an average of 9 percent for 305 people for exceeding the branch norms for servicing equipment.

The difficulty with the application of the brigade form of organization and stimulation of labor in our enterprise consists in that for a long time, beginning with the first five-year plans, the organizational, material and moral methods used in the branch instilled and developed a desire for personal achievements. **Therefore, since we are accustomed to the individual piece-rate payment, collective incentives are being applied in stages, beginning with the calculation of the collective bonus or even part of it for the final results of the brigade, with a gradual changeover to comprehensive ratings and distribution of piece-rate earnings and a collective bonus according to the coefficient of labor participation.** In 126 brigades (more than 2,000 people) wages are paid according to a unified contract with the application of comprehensive rates and the

coefficient of labor participation for distributing the collective earnings, in 96 brigades (1,792 people)—with the application of individual rates and the coefficient of labor participation for the distribution of bonuses, and in 218 brigades (2,764 people)—the piece-rate-plus-bonus system of wages with the application of the coefficient of labor participation for distributing the bonus.

The selection of the brigade leaders is especially important when forming brigades. The brigade leader today is a new type of worker who is at the same time a worker, an organizer, and an educator. Therefore he must be the most qualified worker, a technically knowledgeable specialist with organizational capabilities, and a recognized leader in the collective.

The brigade form of organization and stimulation of labor has required that brigade leaders have more solid knowledge, especially in questions of management and production economics. At one time one of the initial tasks in the overall work for introducing the brigade method was for us the preparation of brigade leaders and the reserve. We opened up courses for brigade leaders for the studying is conducted according to an 84-hour program developed on the basis of a standard program that is approved by the head engineer of the association. Specialists, managers of various ranks, and sociologists were enlisted to teach in these courses.

The basic goal of training in these courses is to teach brigade leaders the peculiarities of collective forms of labor organization, the policy of planning, norm setting and payment for labor under the conditions of the brigade method, and the acquisition of pedagogical knowledge necessary for successful leadership. The program also envisions mastering the fundamentals of psychology and labor legislation. A great deal of attention is devoted to safety equipment and labor hygiene. For a deeper study and retention of the theoretical material, the program envisions conducting practical classes. Those who complete the full course of training take an exam and are awarded a certificate with the established form.

Brigades and the Foreman

Sometimes one hears that the brigade form of labor diminishes the role of the foreman. But in practice we have become convinced of the opposite. The foreman as the representative of the administration at the low level of management of production should be responsible for the preparation of production, the normal functioning of technical equipment, the utilization of the labor force, and the observance of technology. With the brigade form of labor organization he is relieved of the duty of keeping track of the workers and constantly eliminating confusion in the division and cooperation of labor. The main things for him now are engineering and technical work and production management. Additions have been made

to the official instructions of the foreman of the production section. He is obligated to participate in determining the optimal number of people in the brigade on the basis of progressive labor norms and normatives, to provide conditions for the fulfillment of planned assignments, to conduct an analysis of the work of the brigades, to monitor the keeping of labor passports of brigades and brigade stands, and to contribute to the fulfillment of plans for engineering support for the brigades.

The changeover to the brigade form of labor with payment according to the final results became largely the decisive factor in providing for stability of the fulfillment of plans by the shops, factories, and the association as a whole.

But we would not like the readers to get the impression that everything was easy and simple for us with the introduction of the brigade form of labor. Not at all. A new thing, the more so such a thing as the changeover to a new method of work and payment that involves the interests of each worker, does not come painlessly. It is established during the process of overcoming various kinds of difficulties of an organizational and educational nature. **Here it is important to clarify the main thing: the work in the new way provides the necessary effect only with a comprehensive approach to the matter.** It is simple to proclaim this, but extremely difficult to carry it out in practice. For in the brigades there are complex phenomena that do not always submit to regulation. It is possible to take full advantage of the possibilities of the brigade method only if one understands well what is taking place in each brigade, what is impeding the work, why conflicts are arising, and how to resolve them.

We have been faced with a multitude of such questions and we still are. For example, we are not immediately able to figure out this paradox: why do two brigades that have been formed under almost equal conditions work differently and achieve different results? Only by conducting a detailed analysis were we able to reveal the reasons for this kind of divergence and see how technical-economic and social factors have their effect in various subdivisions. It turned out that for comparison it was also necessary to take into account the average level of combination of occupations by the members of the brigade, the level of utilization of equipment, the losses of working time, and product quality. Of course each time the higher return is found in brigades that have actually managed to interest their members in high final results.

We are working on further improvement and expansion of the sphere of application of the brigade form of labor in several directions. New steps are being taken along the path of deepening brigade cost accounting and changing subdivisions over to working under a single contract. We are devoting special attention to the development of labor competition among 214 associated brigades that

have concluded agreements for competition for the achievement of the highest labor productivity throughout the entire technological chain.

Of course we understand that everything that has been done to change over to a better system of organization of collective labor is only the surface layer of the work. The brigade form of labor is far from having said its last word.

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Combine Director's Work Reported

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[Article by L. Shcherbakova: "While Being Concerned, One Can Still Make Demands"]

[Text] When Sergey Artavazdovich first came to the combine where he was to act as director, the first thing he heard was the croaking of frogs. Yes! Frogs! This was a sad picture: the beautiful new buildings of the factories (they were put into operation only 5 years before Manukyan came here) which were light and spacious were drowned in dirt and grime, and the frog concerts which could be heard especially in the evenings were a common thing here. Dusty shops, angry workers who stayed at the cotton combine only in the hope of obtaining an apartment fairly soon...turnover had reached 36 percent.

An energetic, externally and internally intelligent (and honorable) person, Manukyan could not calmly stand by and see all this. Before this he had worked in various positions at three enterprises, but he had never seen such a depressing picture. He was especially irritated by the fact that the enterprise was still new! The "walls" were magnificent, the kind one can only dream about. The idea of creating a combine outside the city and constructing residential buildings and social, cultural and domestic structures at the same time as the construction of the production shops—this is the most progressive today. And still the production assignments were not being fulfilled and the level of labor discipline was unspeakably low. Having looked over the combine Manukyan set a main goal for himself: to try to make the workers love the enterprise. Only then would they give it their forces, their energy and their initiative.

Where To Look for Allies

It seemed that the first assistants and allies should be people who were closer to him than others in terms of their position. But it turned out different. Deputies (with rare exceptions) did not wish to engage in restructuring, hoping that this director would leave after a year or two.

This was the tradition at the cotton combine. The preceding manager of the enterprise was a good engineer and trusted his deputies so much that he did not guide them and they commanded him. Affairs in the association became worse and worse, the collective felt this, and became indignant. Things reached a point where the director was afraid to be seen in the shop.

Thus the first meeting with the deputies and head specialists put everyone in their place. The old director was brought in. In one of the offices of the plant administration they set the table and came for Manukyan. What could he do? His upbringing would not allow him to send the people away but he did not want to participate, and could not: in the existing situation fraternizing could not be allowed. Manukyan did not want to travel the path of his predecessor. The idea of his restructuring had engrossed him and it powerfully dictated the only proper manner of behavior. Under the conditions of the collapse of management, when nobody could be trusted, the manager had to take responsibility for solving all problems, to delve into all trivia, and his word had to be the law for everyone.

He gave his companion 30 minutes to complete the meal and then took himself in hand and said: this was the last time. Thus, incidentally, long before the well-known order, a merciless fight against drunkenness was initiated in the combine.

It was at this time that Manukyan's phrase became well-known: "I will not give you a second warning." It was necessary to bid farewell to some people. For example, the factory's deputy director saw his subordinates drinking and did not stop them, and he was fired for this. Manukyan did not introduce a dry law, as they say at the combine, but a dried-out law. Many began to say that his style was too authoritarian. But he knew that he could do nothing else under the existing circumstances. With time he also found assistants.

How did Sergey Artavazdovich select his assistants? He determined the degree of a person's readiness for management work by observing his interrelations with other people, with his subordinates. He observes how respectfully a person talks to people and how much he respects their work. If he does not divide people up into the "first" and "second" sorts, he knows economics and questions of organization and payment for labor, he is honest and fastidious, if he is able to keep his word—this means that he will grow into a good manager. And now the leadership of the cotton combine includes intelligent people with initiative. But one immediately feels the attitude toward the director and the fact that the director's word here is law. This is the style of the cotton combine. Up to this point the deputies, the directors of the factories, and the head specialists would go into the office of the general director as to an examination, fully armed, as it were, in complete military readiness to answer any question. Manukyan is generally dry and

businesslike and therefore every bit of praise is well-earned and valued especially highly. Is it difficult to work with such a manager? Yes. But this is what is strange at this plant: when people have problems the director's office is the first place they go.

91 Percent Restructuring

So one must do everything necessary for a person to love his enterprise.... The task is extremely indefinite. But this is only at first glance. Manukyan went around to all the factories, studied the territory of the combine, inspected the settlements, and, as a result, earmarked 91 measures for restructuring. They included improvement of management, production organization, and a program for social development. But where should this work be started?

Many suggested beginning with reconstruction (and this is a new enterprise!). But Sergey Artavazdovich did not take this long and costly path and decided to begin with things that were close and comprehensible to everyone. Imposing order in the physical plants and on the grounds. He was (and still is) firmly convinced that if you explain to people what you want and what you intend to do they will understand and support you. At first they looked at him with mistrust, but he was able to convince them. And gradually the people were drawn to follow Manukyan.

First it was necessary to put a stop to the theft. The young director was struck by the scale of it. In 1980 workers of the combine were fined 160,000 rubles for the theft of fabrics. The best ideological workers and executives convince the people that the theft of fabric was the theft of the labor of textile workers and their earnings. At the same time they introduced accounting for products that are produced in the various technological divisions. Agreements concerning material responsibility were concluded with foremen and shop chiefs, and all valuables were checked.

Brigade members who had committed theft had their bonuses for the results of their work reduced by 15-20 percent. Collectives of shifts, shops, factories, departments and brigades that had allowed "leakage of material values were expelled from the socialist competition for the period when the theft took place. People whose guilt of theft has been established are deprived of all kinds of bonuses and, as is written in the collective agreement, are moved 200 positions backward on the waiting list for obtaining residential space. They could leave the territory of the factory only with a permit indicating the time. As a result, in 1985 only 7 rubles were held back, and that was for the theft of electrodes and instruments and not fabrics, and the number of absences decreased by a factor of 7.

To form public opinion so that it is negative with respect to the violators—this was the goal pursued in the struggle for order in production by managers of the cotton combine since they understood that it is impossible to force anyone to be a good person. He must be persuaded to do this.

An Appreciation for Order and Beauty

Previously it was impossible to approach the combine: the railroad tracks were in the way. It was both dangerous and inconvenient to walk across them. The people worked so many Saturdays and Sundays, without pay, of course, in order to make an overpass, constructive bridge, pave the courtyard, lay sidewalks and borders, and plant roses, bushes, and blue firs! A bridge appeared and they introduced permanent trolley and bus routes between the cotton combine and the city. At the last stop they organized a comfortable rest place for the drivers where they could drink tea, watch television, and rest.

We frequently hear the words: the enterprise should become home.... We hear this so frequently that we do not think of what these words mean, and we certainly do not believe in our hearts that this could ever happen. What must be done in order actually to make a home out of a place where a person each day spends about 8 hours and sometimes more? First of all it is necessary to introduce elementary order and cleanliness in the work areas where the people spend most of their time. At "female" enterprises these are the women's rest rooms. In order for them to be clean Manukyan organized brigades of cleaning people and gave them the right to determine their own sizes. They worked on two shifts. Dressed in comfortable and attractive special clothing, the women are constantly cleaning, and not just before and after the work day. And their wages are also fairly high (the fund is not cut): the average level is 170 rubles.

Sergey Artavazdovich's attitude toward what has been earmarked is well illustrated by the story about the glasses for carbonated water. At the beginning of 1981 automated machines for carbonated water were installed at the combine. After the first day all 100 glasses disappeared. They were simply stolen. A thousand glasses were purchased. They also disappeared. Then 5,000—the same thing. Finally they bought 10,000 glasses and installed screens on the machines to protect the reserve glasses. Now there are no glasses missing either in the screened areas or from the automated machines.

There was a time when there were mirrors in the halls of the factories. They were broken. But in the morning the broken mirrors were replaced with new ones, even though this was not cheap. Thus Manukyan gradually made people accustomed to an orderly environment. He worked and he persuaded—and he did not deviate an iota from what he had earmarked. And the people became accustomed to the festive appearance of their foyers, dining rooms, shower rooms and washrooms. Nobody rips the expensive curtains or breaks the mirrors

or pulls up the roses. We must not despair about our failures, says Sergey Artavazdovich, it is necessary to fight for what we have earmarked, without fearing losses or backing down. Every person in his soul loves beauty. It is necessary to awaken the latent feelings for it.

In order to make this work permanent, the combine created a council for aesthetics, in whose work the deputy general director for construction participates. The work has been placed on a solid basis and they take advantage of the capacities of the repair and construction section of the combine whose efforts are being directed toward reconstruction of the enterprise and new construction. All production and other premises and the territory of the combine are divided up into sections, and a specific person is responsible for the aesthetic appearance of each of them. In the Council for Aesthetic they discuss what can be done in a specific section. And there are no secondary objects here; both what can be seen and what is hidden are discussed and improved identically. The purposes are constantly being rearranged and new halls are being created. When one enters the factories one experiences a sense of space: it turns out that they have taken a small part of the second floor—a stream of bright light comes from here and the mirrors and the greenery reinforce the festive feeling. Previously the dressing rooms were a long distance from the shops. The facilities were reconstructed in order to bring them closer to the shops and reduce the amount of time it takes to get to the workplace by 8 minutes.

When you walk through the combine or spend time in the dormitories and kindergartens of the cotton combine, you come to the conclusion that there is a special style here. It includes cleanliness, thoughtful decoration of interiors, and nontraditional use of materials that are available to everyone. Manukyan is especially attentive to kindergartens and dormitories for youth. He visits the kindergarten so frequently that the children recognize him on the street and say to their mothers, "There goes our director!" He loves to bring guests and managers of enterprises here. Having sharpened their skills in economic battles the guests are excited, but they immediately begin to calculate the quantity of materials—brick and cement—and estimate the quantity of labor.... And they ask: "But why do you do this? Such questions leave Manukyan stumped and in order to find a way out he answers that he simply likes to help children. I recall that similar situations were described to me by Vasilii Fedorovich Veres, hero of socialist labor, and general director of the Prikarpatles Association. And indeed why do all this? What motivates them to this selfless labor? "I do not have the right to sit and do nothing and wait for something from the ministry or other sources, when I have a large collective behind me," explains Manukyan.

The kindergarten—the school—the PTU—the combine. The director feels obliged to check on the high quality of this nonproduction "conveyor." A small person sees the beauty surrounding him and recalls that all this was given to him by the combine, he feels concern for the

cotton combine in school, and he enters the GPTU where, incidentally, there are four people competing for every place. There is no need to convince him to go to work at the combine. He is a born textile worker. And even if he does not go to work at the combine, his love for beauty and order will stay with him the rest of his life. The fact that the "conveyor" works without fail is shown by the fact that workers are now hired at the combine only after training in the GPTU and having received the necessary qualifications.

There is an expression that everybody understands well: the prestige of the enterprise, the prestige of the firm, as they say at the Leningrad Svetlana Association, the authority of the enterprise.... It is for this ineluctable prestige that such workers as S. A. Manukyan are working. At the cotton combine they have excellent kindergartens: they have good dormitories that completely meet the requirement set in one of the issues of EKO: it should not be embarrassing to have the director's children there; they construct dormitories for small families; they have a wonderful grass hockey team and when on a sports holiday the whole city can see the green field of the stadium as parachutists land there—the hearts of the cotton combine workers are filled with a special pride in their enterprise: before Manukyan came to the cotton combine there was not a single independent collective, and now each factory has its own choir and even the deputy general director for economics sings in a duet. All these changes have taken place before the eyes of the people.

It is easy for Manukyan to talk to the people: everything he has ever promised the collective has been provided. It is not by accident that the people work on their days off.

Of course much has been given and is being given to the collective in the form of an advance. This includes the first bakeries and the first stores for semimanufactured products. But at the same time at the enterprises they have earmarked ways of returning this advance to the state.

Straightening Out the Confusion

Most of the 91 points pertained to the organization of production. One must say that more than a thousand kinds of raw and processed materials participate in the technological process at the association. From cotton to the prepared fabric—such is the technological chain. Sergey Artavazdovich noted the major points that affect the technology and quality, and began with them. Above all it was necessary to bring order into the auxiliary services, for the final result depended directly on the organization of their work, and there were no possibilities of impacting their work as there were for the basic profession—the weaver. Let us consider, for example, what the work of an equipment cleaner amounts to. In order to clean equipment it is necessary to take the unit apart and then put it back together correctly. But having removed a part it would be good to see how it works, see

what condition it is in, and eliminate shortcomings. This was the duty of the repair workers. The person who removes the spools must perform his operations twice as quickly as the spinner does, and the same thing pertains to the work of the thread breaker. It was necessary to return these impersonal, devalued professions to their real place in the production process. This was difficult: everything in the neglected production was painfully confused. They underestimated the significance of the operation for straightening out the spools, but after all this is a step to high-quality threads. It sometimes happened that the weavers came to the combine by 5 a.m. in order to get the number of spools they needed for work. It seemed like a fantastic situation in which a weaver who was ready to work had to wait for spools. At the same time one cleaner tended 10 combing machines. She had plenty of work up until 11 in the morning, but after that there was nothing for her to do, and the quality of cleaning was completely unsuitable.

Manukyan introduced the brigade form of organization in auxiliary operations as well. Instead of three people who received 110-120 rubles each, they began to have brigades consisting of two people. The wage fund was left the same for them. Thus, in addition to everything else, they managed to reduce the shortage of workers (when Manukyan came they were short 1,250 people, that is, 20 percent of the workers). Special provisions were drawn up concerning stimulation of the work of the brigades. Taking into account the wage rates and the indicators of product quality they managed to increase the wages for this category of workers to 160 rubles. Then the brigades were consolidated and now they include 10 people each.

One of the important components of high quality of products of the textile industry is the observance of temperature and humidity conditions. Previously the equipment that provided for this operated without the necessary preparations and, as a result, it broke down 2-3 times a year and there were not enough air conditioners. Their efficiency factor was 25 percent instead of the required 90 percent). Thus the poor quality of the threads was known to be inevitable. At the new enterprise, which was only 11 years old, by 1975 the system for providing the microclimate became completely non-functional and was completely replaced. With time, through their own efforts, mainly the efforts of scientific research groups in each shop, they improved individual components. The result was quick to be seen. In spinning, which is the heart of weaving, the breaking of the thread at the combine was one-fourth the amount in the branch as a whole.

Bringing order into energy engineering work required great efforts. First of all it was necessary to arrange to obtain detailed, prompt, and precise information about the condition of the elements of the system and about violations of these. Only then was it possible to make correct management decisions. At the combine they installed two TM-320 telemechanics complexes with a volume of 42 control points, two IISE-1-4.8 systems for

accounting for electric energy, one of which is operating on a commercial account. The systems for accounting make it possible to sum up the information concerning the electric energy that is consumed continuously throughout the accounting period (quarter); during the hours of maximum loading of the energy system; during the hours of reduced load during the night; to calculate the value of combined active and reactive capacities during the preceding half hour during the maximum period; to maintain throughout the calculated period the maximum values of combined hourly active and reactive capacity during the hours of maximum loading of the energy system; to put on the display the 5-minute average value of the capacities consumed. This made it possible for the enterprise beginning in the first quarter of 1984 to obtain a maximum rebate from the rate for electric energy—2 percent, which during 1984-1985 amounted to 166,000 rubles, to reduce the down time on machine tools by 1,340 machine hours, and to produce 6,700 meters of fabric a year as a result of this.

What the Combine Gives the Worker

Of all the urgent business, Manukyan considered social problems to be the most urgent. There are now 55,000 people living in the settlement of the cotton combine. All of it, with its utilities, infrastructure, municipal services, stores, and schools is on the shoulders of the combine. People have already become accustomed to the fact that here everything is their own: the asphalt plant, the savings banks, the drug stores—right on the bus stops, ticket booths for interurban buses, airplanes, trains—in the production buildings. They have their own subsidiary farm—their own meat, their own fish from their own ponds....

One is impressed by how well thought out the organization of services is. In fact, everything is convenient: after work one can buy groceries that have been ordered ahead of time at the store right outside the factory, and at the first stopping place of the bus they sell necessities and there is also a pharmacy and savings bank there. In general, every worker at the combine is granted 19 rubles' worth of services. This is 9 rubles more than in the Baltic countries, which are the leaders in the Union in terms of this indicator.

Another peculiarity is the specific market for workers in various age categories. The average age is 24; the combine is young. So let us begin with youth. What specifically does a young weaver, lubricator or scutcher receive? First of all, of course, she lives in a dormitory if her parents live in a different city or village. Here in the dormitory she can join one of 250 clubs. This is the work of the dormitory council which includes qualified specialists. The dormitory is the center for the youthful life. This principle is realized consistently here. In the dormitories they have tailoring shops, barber shops, and laundries. Generally this will not surprise anybody. But the cotton combine already has two buildings for small

families (1,200 young families are living there already) and two are being planned. So if the young people get married there is no special problem about where they will live. And they do not have to wait very long for a separate apartment: in 1986, people whose names were placed on the list in 1978-79 were receiving apartments.

If a girl comes to the factory hungry in the morning, there is a bakery that comes to the workplace. If she has 10 kopecks in her pocket she can have a breakfast of a roll and coffee. If you want to take up sports you will not be alone. In the sections of the cotton combine there are 6,500 people. You are still young and do not always think about tomorrow—therefore you should put your money in your savings account. Something should be left for setting up housekeeping after your wedding. At Factory No 1, for example, the workers have 1 million rubles in their accounts. If you want to have a rest you can purchase a pass to a health sanatorium (it costs 15 rubles, but frequently it is free) where more than 6,500 workers of the cotton combine and their families live and take treatment each year. Twice a year all weavers must be examined in the surdology office.

Special concern is shown for children. There is even a special program here for improving their health. In the summer at the boarding school called "Mother and Child" on the Black Sea (800 children each year) and 24 hours a day in the boarding school. In each of the six kindergartens groups are organized which are brought here for treatment each day. Weak children, especially those who are frequently ill, can live in the boarding school up to 3 months, receiving the entire complex of therapeutic procedures. The mother can live with the child, and when she goes to work he stays with the teacher.

I shall not continue with the list. It would take too much space. But I cannot but mention one more thing: for single people in their declining years a building is being constructed here to house 50 veterans.

And so the worker at the Tiraspol Cotton Combine receives a good deal from the combine and, consequently, from the state. But what do they give to the state? Here are a couple of results of past years. As compared to the 10th Five-Year Plan the volume of commercial output increased by a factor of 3.7. According to the plan this enterprise was intended to operate at a loss (14 million in losses) but the cotton combine obtained 90 million rubles in profit. The volume of fabrics that earned the Emblem of Quality increased by a factor of 5, those with the index "N"—by a factor of 3 (45 percent, and in the branch—15 percent), the enterprise produces 16 groups of fabrics, and labor productivity is one-fourth higher than the average for the branch. Of course not everything is as good as we would like it: especially smooth dyed fabrics. But the combine is gathering speed.

How does one define Manukyan's management credo? What is his workstyle? It is difficult to give a simple answer to this question. He is strict with his subordinates and dry. I shall not spend a long considering why the collective loves such a demanding leader. But here is one statement: "When I began to work here, how unattractive this enterprise was! I was even embarrassed to say that I worked here. But now I am proud of my work and my combine." We all like to work at a respected enterprise under a person we respect. Is this not so?

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Metallurgical Plant Director Recalls Past
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[Article by I. A. Grekhov, candidate of economic sciences, honored metallurgist of the RSFSR (Kamensk-Uralskiy, Sverdlovsk Oblast: "Lessons of the Past and the Present..."]

[Text] Regular readers of our magazine will probably recall the notes from directors of industrial enterprises that we have published in various years.

Today we are continuing to publish notes of directors. The notes of Igor Aleksandrovich Grekhov, foreign director of the Sinarskiy Pipe Plant, are offered for the readers' attention. In 1949, having completed the Ural Polytechnical Institute, he came to the Pervouralsk Pipe Plant. First he worked as a foreman, then as the senior foreman, shop mechanic, deputy shop chief and shop chief, and he was secretary of the plant party committee. In 1969 he became the director of the Sinarskiy Pipe Plant. From here he went on to a personal pension at the beginning of 1985. Thus Igor Aleksandrovich's entire labor biography was linked to ferrous metallurgy. He has accumulated a large amount of experience and many observations. And I. A. Grekhov will share them.

I have worked for more than 35 years in ferrous metallurgy. A great deal has taken place in the branch during that time: there were, of course, achievements, but there were also very serious failures. And now that my successor is sitting at the director's desk in that office with which I am so familiar, when all the director's troubles and concerns fall on his shoulders, I have the opportunity to take time to think and wonder what has led the branch to today's unenviable position. When interpreting the past (the quite recent past), I wish to draw lessons from it which, I would like to believe, would be useful for today's managers. Of course all of my examples are from my own branch. But many of the "diseases" of ferrous metallurgy are a manifestation of that "epidemic" that has gripped our industry as a whole.

In recent years ferrous metallurgy has regularly failed to fulfill the five-year plans for the development of the national economy. A practice has appeared for reporting for the five-year plan in terms of the sum of the fulfillment of the annual plans. One of the main reasons for this is the serious arrears in the area of capital construction. New capacities are started up after the deadlines earmarked by the five-year plan have passed. There were problems in capital construction previously as well. Under the 9th Five-Year Plan, for example, there was high-level consideration of the question of the unsatisfactory course of construction of shops at the Pervouralsk, Severskiy and Sinarskiy Pipe Plants which are located at Sverdlovsk Oblast. After this the construction of all the objects was completed in short periods of time and they were put into operation. And all because the Ministry of Ferrous Metallurgy took the construction of these facilities seriously.

A pipe rolling shop was to be put into operation at the Sinarskiy Pipe Plant under the 11th Five-Year Plan. But it had not been constructed before the end of the five-year plan. The pipe industry did not achieve the envisioned increase in capacities for hot rolled pipe. But the plant introduced capacities for introducing pipes of the petroleum assortment which were to have been made from hot rolled pipes obtained from a new machine tool. The ministry was forced to make a decision to send the blank pieces for the pipes of the petroleum assortment from the Pervouralsk Pipe Plant and to reduce its plan for commercial hot rolled pipes. As a result, the branch reduced the commercial output of these pipes as well as compared to the preceding five-year plan. The losses were large and irretrievable. What is strange is that this fact was not properly evaluated, either by the ministry or by the association. They "kept quiet" about it. There was no analysis of the causes and, consequently, there were no measures that precluded similar interruptions in the future. What are the next actions of the branch management? The shop is to be put into operation under the 12th Five-Year Plan. But the state of affairs is such that there are great doubts about the new deadline for putting the entire complex of the shop into operation.

Why did this situation arise? Why have similar examples become customary? Are only the construction workers to blame? Probably not. The client ministries are no less guilty.

The government decree is undoubtedly an important document. But in order to implement it the economic agencies must exert efforts and regularly check on its fulfillment. It is useless to hope that the central agencies will do the work of the ministries. With the publication of the government decree, the work of the client ministry is just beginning and not ending, as certain managers of the ministry and industrial association think. The workstyle "it is signed—get it out of my way" is unacceptable in any matter, especially in capital construction.

One cannot say that we did not work out the methods for interrelations among involved agencies during the period of construction of industrial objects. These methods exist. I had occasion to participate in the construction of one of the shops of the Novotrubnyy Plant, where I worked in the position of assistant shop chief and was engaged in providing equipment for construction. This was back in the days of the sovnarkhozes. All disagreements with construction organizations were resolved on the spot and the manufacture of nonstandard equipment was done in the plants within the economic region. If an object was constructed according to a government decree there were practically no problems with obtaining funds for equipment in the necessary materials. At the same time the construction of the shop was strictly monitored by the industrial division of the CPSU Central Committee. Fairly frequently I had to report to the instructor of the division concerning the state of affairs and, if necessary, he rendered operational assistance.

Under the 9th Five-Year Plan N. A. Kosygin conducted a conference with directors of metallurgical plants on questions of capital construction where, in addition to the metallurgists, managers of construction organizations and deputy chairmen of the USSR Council of Ministers were in attendance. It lasted about 6 hours and many of the directors had the opportunity to speak. I also submitted a report on which measures were taken subsequently. The conference was distinguished by the fact that decisions were made here regarding the questions that were raised. Perhaps the chairman of the Council of Ministers should not use his limited time on such a conference, but the results were evident. It was necessary to see how uncomfortable the ministries of ferrous metallurgy and construction were during the time of the report. For they reported on their work not only to the Council of Ministers, but also to their subordinates, who know the state of affairs right down to the fine points. The managers of enterprises, in turn, received objective information and support concerning questions of capital construction.

The work of the ministry and the VPO [All-Union Production Association] was arranged correspondingly. The chief of the VPO began any telephone conversation with capital construction. The deputy minister for capital construction, A. P. Likhoradov, was a frequent guest at the plant's construction site. The deputy minister of construction in charge of ferrous metallurgy was usually with him. A business meeting or a joint conference of the two deputy ministers with the first secretary of the CPSU obkom removed many unsolved problems in practice. Of course there were many difficulties; no less than now. But they were overcome more successfully since each manager knew that he bore personal party and administrative responsibility for the matter entrusted to him. In places where it was necessary he was helped, and if he deserved it he was also strictly reprimanded. The results of this kind of leadership are obvious: during the 9th Five-Year Plan the plant constructed two large basic shops and the production volume more than doubled.

Time passed, lessons of past years were forgotten, the responsibility of the managers decreased, and the style of management changed. Instead of "live needs," as the writer P. P. Bazhov said, there were more frequent manifestations of formalism. The failure to fulfill the plan for construction and installation work was no longer regarded as anything extraordinary. As a result, there was a serious failure under the 11th Five-Year Plan both in terms of assimilating funds and in terms of starting up new capacities. But could it really have been otherwise? The deputy minister I. S. Pryanishnikov during the entire five-year plan did not visit the plant's construction site even once, not once did he show any interest in the director's affairs even on the telephone. And this in spite of the fact that the pipe-rolling shop, the only large facility subject to startup under the five-year plan in the pipe industry, was of no small significance even on the scale of the ministry. Attempts on the part of the plant to attract the attention of the leadership of the ministry to the solution to this problem brought no success. I received nothing except evasive answers and advice to go to the VPO. Perhaps this is correct? If there is a VPO located under the same roof as the ministry, should all problems be solved there? But what if they are not solved? Or if they are not within the competence of the association? Sometimes one asks one's subordinates who have returned from Moscow:

"Why was this problem not solved?"

"The association does not solve it."

"Why not go to the deputy minister?"

"A worker of the association answered that it is prohibited to go to him without being called in, on one's own initiative."

It is a closed circle. Yet what can be more important for the managers of the branch than the development of their enterprises? Why have they raised such high bureaucratic fences around themselves?

Again one favorably recalls A. P. Likhoradov, who occupied the position of deputy minister and handled questions of capital construction. He never kept a plant worker in his reception room, he always found time to receive them and listen to them, and he understood that if they come to him this means that all of the ways of solving the problem had been utilized. Moreover, if he found out that a director or deputy director was in Moscow on any issue and did not drop in to see him, he was extremely dissatisfied. Of course he could certainly not solve all the problems all the time. But the very fact that people in the ministry are interested in the problems of your plant is of great psychological significance for the director of the enterprise. Efficient and prompt advice and support if this is deserved and just criticism have undoubtedly contributed to success in work. It now sometimes happens that when one goes into a high ministry office the director immediately hears a stream

of accusations and they are not always expressed in a proper form. And the justifications are simply not heard. Although, of course, even now one encounters who always strived to help the enterprise, for example, the deputy minister N. A. Tulin. But this is more of an exception than anything else.

One of the reasons for the arrears in the branch is the poor work of construction organizations. Regular failure to fulfill plans for construction and installation work leads to a situation where technical documentation issued earlier becomes outdated, it is necessary to rework it, and the batching equipment stipulated by the specifications is not produced by industry. It is necessary to resign the plan, fill out new orders, conduct new agreements with the plants that supply equipment, solve problems of financing, and so forth. The VPO of the pipe industry distributes the allocations allotted by the Gosplan for capital construction among its plants, it coordinates these issues with the construction ministry, and it considers its functions ended with this. The total capital investments for the various enterprises of all ministries and departments come into the main construction administration, which for us is the Glavsreduralstroy, which conducts its work throughout all of Sverdlovsk Oblast. The main administration distributes the plan it receives among the construction trusts based in various cities of the oblast. Here it turns out that in certain cities the trusts are overloaded and in others they do not have enough work. This is how a typical situation in the Uralaluminumstroy Trust is described by the manager, L. P. Kunitsyn: Under the 11th Five-Year Plan the collective of the trust failed to assimilate about 23 billion rubles. But, unfortunately, not everything depends on us. One of the main causes is the lack of balance between the allotted investments and the capacity of the trust. Industrial enterprises will use any means to achieve allotment of funds, in no way being concerned about how they will be assimilated and how the constructed capacities will be loaded and assimilated. As a result, each year the trust is overloaded with orders by 15-20 percent of its capacities.

This statement pertains directly to metallurgists. For various reasons the branch is not fulfilling the plan for production of steel and rolled metal. In 1984 the plants overexpended the carryover residual of blank pipes, and in 1985 the pipe-rolling equipment stood idle for days because of the lack of blank pieces even for pipes in the petroleum assortment. The startup of the new shop at the Sinarskiy Pipe Plant aggravated the state of affairs with blank pipe pieces even more. This can also explain the inertia of the management of the ministry with respect to the construction of the shop. But if it was known that the shop would not be provided with blank pieces (after all, to manage correctly means to know things like this and be able to predict them), why envision it as a startup facility for the 11th Five-Year Plan and diffuse the forces of construction workers which are inadequate to begin with and include unrealistic production volumes in the five-year plan?!

In our city there are many enterprises of various ministries that are carrying out capital construction. The sequence is determined by the importance of the facilities in the national economy. If one also takes into account that the plan for contracting work is being fulfilled at startup facilities for the construction of housing and social, cultural and domestic services, the actual assimilation of the funds for these construction projects and ferrous metallurgy is only about 60 percent.

The ministry and the VPO think that if the monetary funds are allotted according to the plan for the startup of facilities for the five-year plan and coordinated with the Ministry of Construction, their work is completed. The responsibility for poor assimilation of the funds is borne only by the construction workers in this case. But if the capital investments are reduced, the responsibility is placed on the metallurgists who have not provided for financing in the necessary amounts. For this reason the Ministry of Ferrous Metallurgy occupies a formal position which in practice leads to a situation like at the Novotrubnyy and Severskiy Pipe Plants do not receive sufficient capital investments, and the Sinarskiy Pipe Plant cannot assimilate the funds that have been allotted. All three plants are in the same oblast and are included in the same association—Soyuztrubostal. But one is not developing because of the shortage of capital investments, while the others are not because of the inadequate capacities of the construction organizations. For the 12th Five-Year Plan as a whole, at our plant it is intended to construct a new division for producing pump and compressor pipes for the petroleum industry which has been receiving imported equipment for a long time. The management of the plant raised in the ministry the question of transferring the construction to the other plant, where there are real possibilities, but the question was not resolved and the imported automated flow lines continue to lie in the warehouse.

The problem is a serious one and the usual list of measures drawn up each year by the client and the contractor will not solve it. One cannot hope to enlist less skilled workers either: they are not willing to go into construction. Attempts to send skilled construction workers here from other cities are not realistic. I do not think that there will be a radical improvement in construction in the near future. We must recognize that the construction workers have great difficulties and it is necessary to meet them halfway.

How is the work of the construction trust being arranged now? Having achieved an unrealistic plan, the construction workers do everything within their power to have it revised, of course, on the basis of their own interest. There is an active struggle not for the plan, but against the plan. The enterprise usually receives adjustments to the plan for the current year at the end of February, and before this they cherish hope that it will be reduced. Joint measures of the trust and the plant, as a rule, are not fulfilled. There are not enough materials, there are not enough labor resources, and other difficulties appear

which are inevitable even with ideal planning. Shop work on the startup project begins approximately in May. In the fourth quarter all attention is devoted to the construction of housing and facilities for social, cultural and domestic purposes since at this time up to 40 percent of this annual plan is for housing. Let us add here also the irregular breakdown of the plan for the various quarters of the year: everything the trust cannot accomplish is transferred to the fourth quarter, and the appearance of well-being is created during the first three quarters. And unfinished projects are in the most unfavorable conditions: the provision of materials for them is the worst and in individual months it is even prohibited to give them any so that the percentage of fulfillment of the plan with respect to these will be higher than at the startup projects. In the final analysis leads to underfulfillment in the trust as a whole. The role of the director of the client enterprise amounts to not receiving complaints from the builders concerning documentation, financing, and other problems that should be resolved by the client.

The time comes when the unfinished object becomes a startup object. Since the necessary reserve is not created during the preceding years, the previously approved complexes are revised. The basic shop is introduced and the auxiliary sections are transferred to other complexes. The object is accepted with incomplete work and the services of the head mechanic, head engineer, transportation and warehousing and others do not receive the development envisioned by the plan. All this leads to serious difficulties in the work of the plant and pushes back the time period for the assimilation of the planned capacities. Who can we blame when this vicious cycle goes on from year to year? Only ourselves!

The fairly frequent change of leaders is of no small importance in the work of builders. During my 15 years working as director of the plant the managers of the trust changed six times and the chiefs of the main administration—four times. After one of the Moscow conferences in which the builders were sharply criticized for poor work, I asked a question of the chief of Glavsreduralstroy, S. V. Bashilov: "How will you work in the future?" I received an answer immediately: "I will fire the manager of the trust." Indeed, soon after that the manager of the Uralaluminstroy Trust, A. K. Polyakov, was relieved of his position. S. V. Bashilov did not work in his position for very long either, but the situation did not change.

To improve things certain changes should be made in the policy for accepting for operation objects that have been completed by the builders. According to the existing provisions the acceptance is done by a state commission which consists of representatives of the client, the contractor, the planning organizations, various inspection teams, and so forth. All these managers participate directly in the construction or planning. In practice at a meeting of the state commission they consider questions

of the interrelations between the client and the contractor: How has each of these fulfilled his commitment? The manager of the enterprise submits to the state commission guidelines about the availability of workers necessary for producing the raw or processed materials. The solutions to these problems depend not only on him but also on the higher organizations. It takes time to answer the question of whether or not the equipment and all the planned assortment is provided in keeping with the existing GOST's, the given productivity, and economic indicators.

In order to prevent undesirable influence on the work of the state commission from outside, I think that its chairman should be a responsible representative of the ministry or VPO, who is given certain authority. The concluding act of acceptance of a large industrial object should be conducted after the time period for assimilation but no more than a year after the completion of construction, once this issue has been discussed in the board of the ministry with a report from the chairman of the state commission or the plant director. It would be useful for the board of the ministry to be given the right to make adjustments in planning technical-economic indicators as to plan production indicators correctly in the future. The very fact that managers of any rank are accountable for the work that has been done and responsible for mistakes that are made will produce positive results. During the time of capital construction enterprises and organizations of various ministries and departments have been put to work. It would be expedient for an interdepartmental commission to prepare the materials for the ministry board, enlisting representatives from involved ministries, and disputed issues should be regulated in this commission or in the USSR Council of Ministers.

What is the secret of the effectiveness of reconstruction of existing enterprises as compared to new capital construction: the answer is simple—it is the result of the high level of interest of the labor collective in the final result and, consequently, the active participation of plant workers in all stages of the work, beginning with planning. But the activity does not come of its own accord. The need for and expediency of the forthcoming work is explained to the entire plant collective, and all kinds of mass information are used. It is important for the labor collective to be intimately involved in the reconstruction. Various methods can be used to achieve this goal, but the work that is done should result in creating the general opinion in the plant that the work for reconstruction is the vital affair of each member of the labor collective, and each member must know what is required of him for success. This pertains not only to work within the shop, where the reconstruction is to be carried out, but to all workers of the enterprise who through their work affect the success of the reconstruction.

Usually there is no shortage of ideas about technical reequipment and reconstruction. The management is faced with the task of selecting the most crucial for the

enterprise, taking existing possibilities into account. As a rule, the initiators of the idea are workers of the shop collective. If the shop's own forces are not sufficient to realize it, the plant services are enlisted.

Planning occupies a special place in successful reconstruction. From the very beginning production workers participate in planning work since they will subsequently install and adjust the equipment, assimilate the planned capacity and operate the new equipment. They are well aware of the conditions in the shop and, moreover, the reconstruction is carried out under the conditions of an operating shop and is strictly limited in time. In a short period of time it is necessary to assimilate a large quantity of capital investments and provide for high quality of the work. Optimal planning decisions are found through the joint efforts of specialists of planning organizations and the shop.

An initiative group of plant specialists is created by an order for the plant to coordinate this work. Some of them are relieved of their basic work and others are given the duties of checking on the work without leave from their basic work. As the volume of work grows, the initiative group is augmented with new members.

During the time of preparation for construction no less frequently than once a month the plant director or his deputy checks on the state of affairs, and keeps the minutes of the conference which determines the direction of the work. Between the conferences the implementation of measures earmarked in the meetings is supervised.

The plant newspaper has a permanent section devoted to reconstruction. The entire plant collective knows how the preparation for reconstruction is proceeding and what is hampering it. Orders for the manufacture of parts has special designations and the workers of the mechanics or other auxiliary shops know that today they are working on the reconstruction. In addition to moral incentives, there is a system of material incentives for workers for reducing the time periods for performing the planned work.

For the time of the reconstruction a special staff is created under the leadership of the plant's head engineer. For this period all plant services that have anything to do with reconstruction are under his jurisdiction and they have their own permanent authorized representatives on the staff. Thus the chief of staff is given the necessary rights to resolve any disputes that arise between the builders and the basic production of the plant.

(Conclusion in next issue)

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Progress of Computer Use Traced *18200222f Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO) in Russian No 7, Jul 87 pp 57-80*

[Article by Yu. I. Tychkov, doctor of economic sciences (Moscow): "The Possibilities of Computer Equipment and Improvement of Management of the Enterprise"; a discussion; first two paragraphs EKO introduction]

[Text] We have not yet erased from our memory the bright hopes at the end of the 1960's and the beginning of the 1970's linked to the prospects of utilizing computer equipment in various aspects of the activity of the enterprise. Special hopes were placed in automated control systems. Many enterprises of the country purchased costly equipment and increased the staffs of people to service it, but the lack of a profound professional approach and unified management of this process led to a pessimism that was just as unanimous as the enthusiasm was: the computers were standing unused or half-used, and many ASU's became a costly but ineffective toy. Gradually ASU's began to be mentioned less and less frequently in the press and they began to write less and less frequently about the possibilities of computer equipment at the enterprise.

What new aspects can be introduced into the life of the modern enterprise by electronic computer equipment. If one takes its introduction and utilization seriously, at a high professional level? The editorial staff will be grateful to readers who continue this discussion.

At the present time two aspects seem to be the main ones: improvement of the economic mechanism and change in the psychology of economic thinking among a broad group of managers and specialists as well as all workers. We shall illustrate the difficulty in restructuring economic thinking by the state of affairs in two sufficiently general and important areas of management.

First. Everyone knows the decree published in September 1983 by the CPSU Central Committee, "On Improving the Organization and Practice of Summing Up the Results of Socialist Competition and Encouraging Its Winners." The decree was directed toward changing over to indicators of effectiveness in evaluating competing collectives and rejecting volume indicators of plans that characterize the percentage of fulfillment.

This reorientation was of fundamental importance, since it actually did correspond to the strategy of acceleration. But the inertia of the customary economic thinking that had become entrenched over many years led to a situation where in the majority of cases no principal changes took place in the organization of competition. Neither the economic nor the trade union agencies developed a new system of indicators which would orient the collectives toward the adoption of achievement of advanced goals in the rates of growth of production volumes, labor productivity and other most important indicators, and

not percentages of overfulfillment of the plan which in terms of their difficulty were frequently not comparable even among enterprises that were related by virtue of the nature of their production.

Unfortunately, it must be stated that indicators so important from the standpoint of the real effectiveness of production as the growth of the output-capital ratio, the effectiveness of capital investments (increase of output per ruble of invested funds), the ratio between the gross rates of labor productivity and the capital availability for labor practically not taken into account in the management of socialist competition and, consequently, they are not stimulated. Economic science has not had its say in this respect either.

Second. The changeover to the strategy of acceleration requires, in our opinion, a significant restructuring and improvement of the very technology for management activities at all levels of the hierarchical pyramid of the national economy: from the shops and enterprises to the regions and departments. The most important thing here is the most rapid changeover from directive, arbitrary planning and management, whereby decisions are also frequently made without enough information, to management that is based on the utilization of economic criteria and sufficient information. Such a technology of management envisions the development of analytical bases and the principle of alternative choices when developing management decisions.

Unfortunately, the inertia of economic thinking caused a stagnant situation in the sphere of management whereby the technology of management labor (at least at the level of industrial enterprises) remains at the level of the first postwar years. People can object that this assertion is incorrect since during 1971-1986 hundreds of ASUP's were introduced and computer equipment of the third generation has entered the sphere of management. But in spite of all this what was said above is still correct since because of a number of circumstances the introduction of the ASUP's affected and changed only one aspect of management activity: planning and reporting procedures.

I have already had occasion to discuss this subject on the pages of EKO. For the first time in 1978 (No 5) and again in 1985 (No 4). But even now, unfortunately, I cannot state that in the sphere of management of most of the industrial enterprises there have been inappreciable changes that were conditioned by the immeasurably large and, in a number of cases, principally new possibilities opened up to us managers by modern computer equipment.

On the basis of my own many years of work experience in this area and numerous discussions with management colleagues and specialists concerning the application of computer equipment in management, I can assert that problems of improving management activity on the basis of maximum utilization of the possibilities of modern

computer equipment, electronization of management and the changeover to high-information management technology are linked to a considerable degree precisely to the breaking down and changing stable stereotypes of management thinking that have developed over the years among a broad range of specialists. To this one should add the inadequate level of information of the broad masses of management practitioners, including top managers, concerning the real possibilities of modern computer equipment and the corresponding software, and also examples of highly effective utilization of these possibilities in practice.

The Overall Situation in the Sphere of Management of Industrial Enterprises

It is characterized by two tendencies. Improvement of production on the technical plane and the growth of industrial potential are proceeding at more rapid rates than the improvement of management. Moreover, in the sphere of management activity itself there is an increasing difference between the actually existing and the ever-growing possibilities related to computer equipment of the third generation, on the one hand, and the corresponding developments in the area of software and the degree of their utilization and the practice of management, on the other.

Both tendencies are negative in nature and bring about the appearance in the national economy of problems of "unutilized capabilities." It must be emphasized that the problem is being aggravated since in the development of technical production systems (machine tools and other technological equipment) the main direction is to increase their unit capacity, equip them with numerical program control systems, and to change over to sets of interconnected and program controlled machines and mechanisms (systems that have been given the name GPS). One should add to what has been said the fact that the cost of equipment frequently increases disproportionately more rapidly than its productivity does.

All this can be illustrated with concrete quantitative characteristics. Thus while in 1960 the "average statistical machine tool" produced in the USSR cost 2,500 rubles, by 1983 its cost had increased to 11,500 rubles. But still it did not provide for a five-fold increase in its production capabilities. Even more typical is the example with the increased costs of the 16K20 lathe produced by the Moscow Krasnyy Proletariy Plant. During the 1970's this largest lathe in our country cost 4,500 rubles. The machine tool created on the basis of this with numerical program control costs 43,000 rubles, and its "robotized" variant costs 60,000 rubles.

Special concern is caused by the fact that not only has there not been a tenfold increase in the productivity of the machine as a technical system, but the conditions for the utilization of such equipment in the majority of cases have remained the same as they were or at best they are

operated on two shifts. While from the economic standpoint it is a most important problem to change the loading of conventional equipment from 1.3-1.4 shifts to two shifts, with the utilization of equipment with numerical program control such conditions for utilization are simply inadmissible. Calculations show that the utilization of equipment with numerical program control, especially processing centers whose cost exceeds 100,000 rubles, can be economically justified only with three-shift working conditions. We must add to what has been said the fact that the tendency to change over to flexible automated systems, which will make it possible to increase labor productivity by a factor of 6-10 (depending on the type of production) will require changing over to a "sliding" schedule for their operation and continuous work, including on Saturdays and Sundays, with the equipment being halted only for preventive maintenance and on holidays.

Thus the existing situation in which it is typical to have increased "unutilized capabilities" cannot but cause concern, especially if one takes into account that, in addition to the aforementioned, increasing the level of dynamism and expansion of cooperative ties are important tendencies in the development of industrial production. This causes an increase in the "cost" of management decisions and requires the creation of technology for making them that is based on sufficiently complete, prompt and objective information.

It is precisely because management is lagging behind scientific and technical improvement in the sphere of material production that has generated the problem of "unutilized capabilities" (incomplete loading of equipment, unsatisfactory utilization of labor, material and other kinds of resources). In this case we do not take into account the negative influence of the shortcomings of the management mechanism itself since the problem of improving management is independent. Everything that has been said above requires a shift of emphasis in the efforts of the society for increasing the production of industrial products and improving its quality in the direction of accelerated solutions to problems of improving management. In this connection I should like to express my views on the paths for the development of the ASUP that are based on the practical experience I have accumulated.

Ways of Improving the ASUP

The ASUP should be regarded as a man-machine system in which planning-reporting functions and functions of information support for various management procedures, including the procedures for making decisions at high management levels, should be equally automated. Thus we are speaking about utilizing not only the computational, but also the informational capabilities of computer equipment. To this end it is necessary to form a specialized block of information systems, both functional and special management systems (UIS) that are intended to satisfy

the information needs of specialists and managers at various ranks in all the areas of their activity and the development of the enterprise.

We shall show the principally new possibilities that open up this way by the example of the utilization of computer equipment for controlling the load on equipment with numerical program control. Here we should be interested not so much in the coefficient of shift work of this more productive equipment as the proportion of effective machine time (time used directly for the formation of the part in the machine tool) in the overall calendar time budget. It is relatively simple to establish this by registering with the computer, including microprocessors of the Elektronika-60 type, the time for reading the programs from the memory of the device that controls the machine tool. The corresponding program software makes it possible to acquire this at the end of each shift and the cumulative totals for the day, 10-day period and month in which for each unit of equipment with numerical program control it will show the objectively registered effective machine time. The first experience in utilizing such an information system within the framework of the ASU-Apparat showed that the apparently good situation with respect to the utilization of processing centers with numerical program control, which is based on three-shift operation with a coefficient of multiple machine tool service of 2, is illusory since the proportion of effective machine time in many cases turned out to be less than 40-50 percent (mainly for parts with short processing cycles). Such information systems should be further developed by equipping the workplaces of operators of machine tools with numerical program control with the simplest panels which the worker can use to put into the computer's memory information (in the form of the numerical figures designating the causes) about the most typical causes of ineffective expenditures of machine time (the lack or the malfunctioning of an instrument, the lack of blank pieces, the malfunctioning of the machine tool, and so forth). In this case it is realistic not only to register the ineffective expenditures of machine time, which is important in and of itself, but also to conduct an objective machine analysis of the causes of the negative phenomenon.

The importance of the problem of creating information support systems at industrial enterprises as the basis for improving the technology for developing management decisions and information as the basic resource in management is illustrated best of all by looking at the block-diagram given in Fig. 1. The industrial enterprise is represented here as a closed system with direct and reverse ties which consists of the managed (basic material production) and managing (functional management services) blocks. It is clear from the diagram that a management decision is the basic product of the management system and information is the basic resource used in management. Hence the important conclusion that it is necessary to draw and provide for a complete analogy in questions of improving both basic material

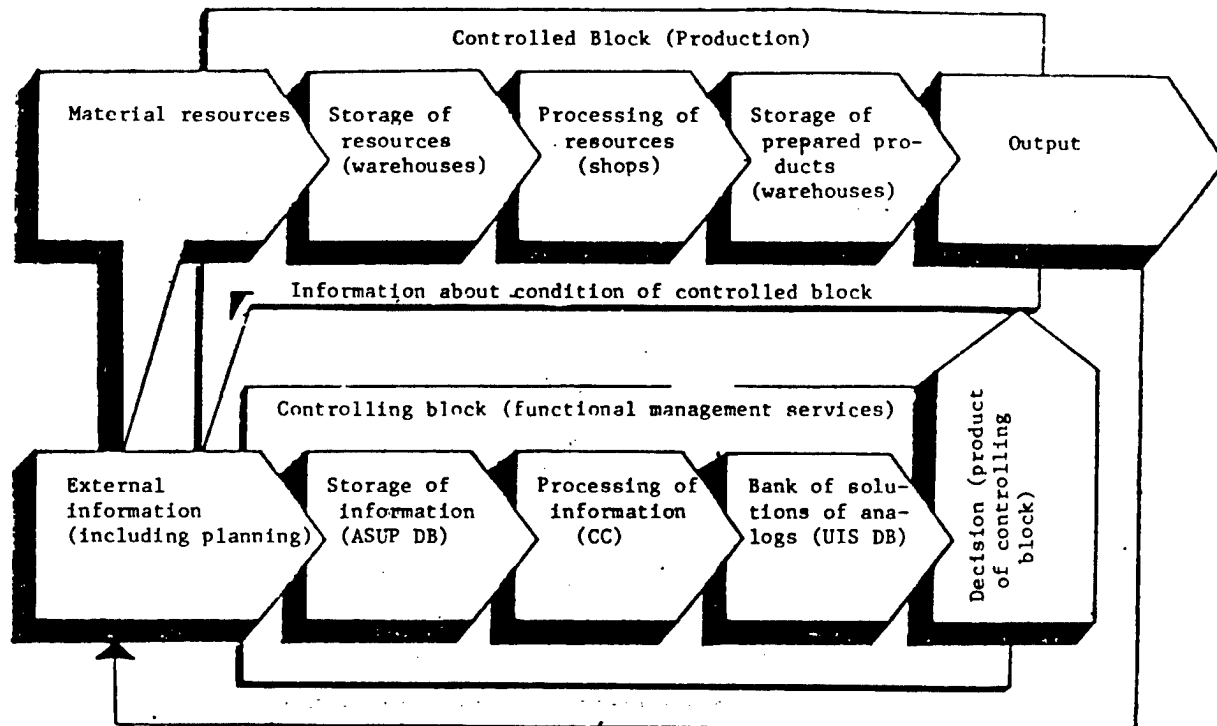


Figure 1: Information About Results of Function of Controlled Block

production and the management apparatus, whose activity should be subjected just as carefully to analysis and improvement, including in the creation of the most improved and best supply technology for gathering, storing and processing information and granting it to the user in the most easily understood form. Let us add that management activity (especially regularly repeated procedures, which is typical of middle-level management) should, by analogy with the basic production and the managed block, be just as carefully regulated by the corresponding organizational and legal documentation. Only then is it possible to expect sufficiently effective utilization of the broad range of specialists employed in management and the new possibilities offered by modern computer equipment.

Up until recently, in the majority of cases such an approach has not been taken to questions of improving management. While in the sphere of material production such concepts as mechanization and automation have become customary, and recently these criteria have been extended also to the sphere of design and technological preparation of production (SAPR of various functional areas), there is nothing similar in the sphere of management. Consequently, there is no planning or tracing of the changes in the level of technical support for various management procedures or the sphere of management as a whole. Yet there is an urgent need to introduce into practice such concepts as the level of provision of information and utilization of electronic equipment in

management. The criterion for evaluating this level could be the ratio between the number of management procedures whose information support is provided through automated supply of information from the corresponding ASUP subsystems, the functional information system or the UIS, and the number of management procedures whose information support is provided by traditional methods. It is also possible to take other approaches to quantitatively evaluating the level and degree of technical support for management using the capabilities of computer equipment. In this case it is important to have analogous principles in the approaches to improving the technology of management and that of material production, including the stage of its preparation, that is, the activity of design and technological services.

In order to provide for the creation of such technology it is necessary to develop and introduce special automated workplaces for management personnel like the ARM's of the designer and technologists, and in the stage of information processing it is necessary to change over from "package" processing of portions of information accumulated over a certain time period to continuous processing of individual notifications that come in at random points in time. Here, naturally, the manager should have the opportunity at any point in time, using the ARM, to access the corresponding databases of the system. The introduction of such ARM's into the daily work practice

will make it possible for specialists employed in management to change over gradually from using the computer in individual aspects of their activity to a system where the computer is naturally built into the management technology, that is, to man-machine systems for decision making. The creation and utilization of such systems will create prerequisites for obtaining an adequate model of production, utilizing modeling methods more extensively, and developing analytical functions in real management practice.

Management man-machine systems' basic method of communication between the users and the computers is remote access, which requires that there be a sufficiently ramified terminal network in the organization. A teleprocessing system provides principally new possibilities for improving management and makes the incomparable capabilities of computer equipment comprehensible and useful in practice for a broad range of If this system is not utilized widely enough, there is a principal change in the degree of information for management activity. With the traditional technology for having information accompany material flows, the information is registered and accumulated in the form of various paper bearers (notices, release invoices, accompanying passports, and so forth). After the conclusion of the technological cycle or the planning period the information, being separated from the material flows, becomes difficult to access for purposes of analysis and utilization during planning, even if archive storage has been organized. With the changeover to teleprocessing, all the necessary information concerning the processes of material production is accumulated in the external memory of the computer on magnetic bearers, remaining easy to access for a broad range of users at any point in time, which opens up the possibility of further improving both planning-reporting and analytical activity in management.

Extensive utilization of remote access brings us actually closer to "paper-free technology" in management. In addition to the advantages mentioned above, let us point out that the average coefficient of utilization of documents generated in the ASUP and presented in the form of machine printouts, as a rule, does not exceed 50 percent, and the rest remain unutilized as excess baggage in the desks of the managers. If one takes into account that we are speaking about tons of paper which is in short supply and hundreds of hours of useless loading of printing devices just within one enterprise, the advantages of remote access becomes even more obvious. Let us add that a considerable proportion of the information (according to our calculations, about 15 percent) in the ASUP is sufficiently up to date, while the times for delivery of traditional bearers of information—as a rule, documents—is 2-3 days within a single organization. This leads to a situation where every fourth document is delivered late to the addressee, frequently becoming useful. The availability of a remote access network eliminates this shortcoming.

All that has been said gives us complete justification to assert that a system of teleprocessing in the sphere of

management should play an equally revolutionizing role as the new base technologies (laser, powder metallurgy, and so forth) in the sphere of basic production.

Questions of creating information support and improving management activity on the basis of this have been raised in a number of special publications. In this connection, in the future it would be expedient to elucidate the experience in the creation and introduction of a network of remote access and automated work places both at the high management level and at the level of line workers of functional subdivisions and the production dispatcher division with respect to an actually functioning ASU of an industrial enterprise.

The Teleprocessing System Is the Most Important Factor in Increasing the Effectiveness of the ASUP

During the course of the work for developing and improving ASU's that is being done within the framework of the concept briefly formulated above, at the beginning of 1985 a ramified teleprocessing network was created which serves the basic spheres of the activity of enterprises included in the integrated automated control system. The teleprocessing network was designed on principles of system teleprocessing. As a central nucleus of the network they used the YeS-1033 computer with an operating memory of 1 megabyte which functions under the control of the OS YeS Version 6.1. The network includes 66 terminals of the YeS-7934 type and 30 rapid printers.

Terminals have been installed in all shops of basic production, the production-dispatcher and planning-economics divisions, the series design bureau, the head technologist's division, the division for organization of labor and wages, the division for preparation of production, in the office of the plant manager, and so forth. The formation of local networks is being completed within the framework with individual shops where their computer equipment is composed of computers of the SM-4 and SM-1420 series. In the next few years it is intended to merge (for expedience) the computer equipment into a unified system.

Under ordinary conditions the network functions each day from 8 am until 7 pm. At the request of a user the time of operation can be increased. The time for response to a command is 1-5 seconds, the average time for restoration after a failure is 0.6 hours, and the average number of times the users access the network is about 14,000 a day. The overall volume of information available to the users with remote access is about 250 megabytes.

Only applied software for the tasks functioning in the teleprocessing system was developed under the control of the KAMA teleprocessing operation system. The unified access method provides for economizing on the computer resource that is in shortest supply for the

teleprocessing system—operational memory. The languages providing for a dialogue between the users and the computers are sufficiently simple and can be mastered by the user in a couple of days. The number of users in the teleprocessing network, who include designers, technologists, planners, dispatchers, warehousemen, chiefs of the production-dispatch bureau, managers of shops and functional services, and the management of the enterprise, exceeded 500 people.

The remote access system is actively used in such important areas as normative work for all kinds of resources, tasks of operational control of basic production, technical preparation of production, the management information system, systems for monitoring the course of the fulfillment of various kinds of plans, schedules, and protocols, and so forth. The most significant of these areas is the utilization of means of teleprocessing in the subsystem for operational control of basic production, particularly, operational reporting, control, analysis and regulation of the course of production.

In order to ensure quality in the necessary level of dynamism of normative reference information a system has been introduced whereby the corresponding sections of the BD ASU are kept by the responsible specialists directly at the worst places, which are equipped with terminals of the YeS-7927 type. Work for improving the system of technical preparation of production has independent significance. It is also based on remote access for forming the information fund, which reflects the condition of the work for this area which is important for dynamically developing enterprises.

Taking into account the fact that the experience in utilizing the system of remote access in management information systems has already been presented in EKO (see No 5 for 1978 and No 4 for 1985), let us discuss in somewhat greater detail the most important areas for the utilization of the teleprocessing system in operational control of production.

Operational accounting for the release of products by shops. Improvement of initial accounting and increasing its efficiency and reliability are key tasks in the ASU. In intraplant accounting it is especially important to account for intershop transfers and release of parts by shops to the central batching warehouse, which is the basis of intershop planning.

The system of operational accounting for intershop transfers of parts is based on putting information into the computer concerning the movement of batches of parts through the various shops of the technological root. This input is done by line personnel directly from the terminals established in the shops. The system is constructed on the following principles: uniqueness of the input of information; the secondary nature of the document, that is, obtaining accounting documents formed in

the memory of the computer; the possibility of operationally tracing the course of the manufacture of batches of parts; the exclusion of specially introduced information (for example, the codes of the parts and so forth).

Each act of transferring a batch of parts or assembly units from shop to shop is registered on the screen of the terminal by the worker of the warehouse for prepared products or the planning-dispatch bureau of the shops, and the document (invoice for the transfer of the batch of parts) reflecting this fact is formed on the initiative of the computer on the printer that is installed next to the terminal, that is, it is secondary. Each day reports are formulated concerning the release of products in the processed sections of shops, orders for the day, and at the beginning of the month, reports concerning the failure to meet time periods for covering shortages. The accumulation of such accounting information in the computer's memory makes it possible in real time to obtain on the terminal screens installed in the subdivisions of the enterprise information about the volumes of products released by the shop for the current date, the movement of any batch of parts throughout the various shops, and the actual availability of materials in terms of any physician in the manufacturing shops and to the central batching warehouse.

Fully implementing the principle of uniformity of input has minimized labor expenditures on accounting. These data are the basis for machine formulation of information concerning the condition of incomplete production, accounting for the transfer of expenditures among shops under the conditions of intraplant cost accounting, control of the course of fulfillment of the production program by the shops, evaluation of the regularity of the operation of the shops, the formulation of information concerning shortages and the fulfillment of a whole series of functions for analyzing the state of affairs in the basic production. The functioning of the system for operational accounting using display terminals has made it possible to eliminate from circulation all hard copy and to automate the receipt of all report information in this area.

Automation of dispatcher control. The increase in production volumes, including the accompanying growth of planned lists of parts and components, and the assimilation of new products frequently lead to an increase in the number of shortage items. Their manufacture is especially supervised both by line supervisors and by the dispatcher service. There are frequent cases in which the number of items in short supply amounts to hundreds and exceeds the limits of controllability. Naturally, the solution involving increasing the number of personnel in the dispatcher service is unfeasible. The real solution is automated control of the current course of production using a network of terminals installed in the basic production shops and in the dispatcher service of the enterprise. The creation of a central dispatcher point equipped with video terminals for operational intraplant communications (telephone-telegraph, loudspeaker, and

devices for displaying information for collective use) makes it possible for the dispatchers to objectively trace the current course of production without running around the various shops. Meeting these conditions in the enterprise's ASU made it possible to introduce an automated system of dispatcher control.

The complex of tasks of dispatcher control functioning at the present time provides for:

- the determination of the shortage of parts and assembly units manufactured internally for the plan for batching for assembly shops;
- the distribution of the shortage among the various manufacturing shops in the cross-section of orders and the formation of preliminary schedules for covering it;
- adjustment, if necessary, of the schedules for covering the shortage with means of remote access;
- evaluation of the shortage in terms of the labor-intensiveness of manufacture both for the individual list of products and for the various shops;
- the determination and putting into the computer memory of causes for the appearance of the shortage utilizing means of remote access;
- operational checking on the fulfillment of schedules for covering the shortage and the formation of information concerning failure to meet the deadlines;
- operational analysis with the help of means for remote access of recurrent condition of incomplete production in the shops on the technological root;
- evaluation of the provision of batching items for incomplete production in the cross-section of the orders and shops.

The determination and input into the computer memory of the causes for the shortage after the completion of the planning period makes it possible to conduct an analysis of the condition of the shortage in the cross-section of the shops, orders, causes, and time periods and an analysis of the repetition of the shortage during the past 12 months. Such an analysis provides for the development of substantiated measures for eliminating the shortage and leads to planned work in this area with the possibilities of evaluating the effectiveness of measures that have been taken.

The changeover in dispatcher control to a system of remote access made it possible to realize one of the most important principles in management activity—the principle of informational independence.

The system of normative reference information of the ASU of means of remote access. Maintaining an up-to-date and reliable information base, which has always been one of the major directions for improving the ASU, is becoming a key problem in the work of systems of real time. It was decided to bring the user (designer, technologist, planner, and so forth) as close as possible to the information supply, to give them personal responsibility, and to eliminate intermediaries between them and the

computers. This direction was followed at the enterprise through comprehensive support of functional services with dialogue means of direct access to data.

The introduction of the teleprocessing system made it possible to provide for:

- rapid search for various kinds of information concerning the design composition of the item, the technology of its manufacture, the applicability of purchased items and materials, and so forth;
- the possibility of effective work on unification and standardizations;
- equal information possibilities and identical information for all users;
- the elimination of the intermediate stages in preparation and verification, which increased the reliability of the information;
- a significant reduction of labor expenditures on maintaining the ASU information supply in reliable condition;
- completeness of conducting various kinds of changes; for example, the change of one type of material for another which is carried out with the help of the operation "group change," is automatically guaranteed in all entries containing this type of material;
- increased responsibility of the workers of functional services for the quality of information.

The normative reference information at the enterprise, which can be obtained expediently with means of remote access, is processed in the same system.

The instruments for maintaining the teleprocessing network in working order. Effective operation of the remote access networks is possible only with its reliable information, acceptable time of response to a command, operational analysis of emergency situations and rapid restoration of the network's working order. To this end on the base of the PPP "Primus" they have developed a monitor for operational observance and control over the functioning of the teleprocessing system. The control monitor makes it possible to obtain the following information:

- generalized statistics from the PPP "Kama";
- the condition and statistics for the terminals of the systems;
- the condition of active terminals at a given time;
- the condition of files served by the system;
- the time of reaction of the teleprocessing system to commands from the users;
- continuous reporting on the condition of an active program and a specific terminal.

This information makes it possible to operationally discover the cause of abnormal functioning of individual programs at the disposal of the dispatcher and to take measures to normalize the functioning of the system.

The construction of a ramified teleprocessing network at the enterprise and experience in its operation have confirmed the high effectiveness of the utilization of teleprocessing methods in the ASU. In essence they have created an actually functioning dynamic model of the current condition of production. The introduction of teleprocessing made it possible to significantly increase the effectiveness of the ASU tasks.

The utilization of means of teleprocessing led to a deeper understanding of the possibilities of electronic computer equipment by a broad range of readers and, as a result, their increased activity in utilizing computers in production work. One important conclusion is that it showed in practice the possibility of creating on the basis of the utilization of domestic equipment a sufficiently powerful network for remote access within whose framework a whole series of decisive functions of the ASUP were carried out in real time.

Improvement of the Organizational Structure of Management and the System of Information Exchange Under the Conditions of the ASUP

The creation of a block of information systems, including UIS [information control system] and the changeover to conditions for remote access by a broad range of specialists at all levels of management contributes to significantly increasing the effectiveness of the ASUP, imparts principally new qualities to it, and opens up principally new possibilities for managers in their work. The realization of these possibilities requires certain innovations in management structures since people making the decisions are not in a position even under the conditions of the availability of the UIS and information systems to single-handedly "digest" the information generated by them even under conditions of a dialogue with the computer. Moreover, the processing of information into a form that is convenient for efficient utilization at times of development and adoption of decisions should as a kind of activity be severed from the person making the decision and become the task of a special group of specialists. Decision making under the conditions of the functioning of the UIS changes the very psychology and the workers have a greater understanding of the importance of information as the most important resource utilized in management activity and an understanding of the need for further constant improvement of the system of information support. Geographically the diagrams for information exchange in the management non-machine system which utilizes the UIS can be presented in the form of Fig. 2.

The practice of creating and utilizing the UIS convincingly shows that with a serious creative attitude on the part of the person making the decision as the user of the system even after the first year of operation there is a significant reduction of the frequency of the use of certain forms since many of them contain information about parameters that are not subject to sharp quantitative changes from month to month (average wages,

percentage of fulfillment of output norms and so forth, indicators in the cross-section of the shops, and so forth). The qualitative descriptions for those indicators are fed into the memory of the user but at the same time he gains a better understanding of the fact that the entire totality of accumulated information which encompasses, as was pointed out, all areas of the activity of the organization, cannot be interpreted and analyzed solely by the manager using the UIS as a subject for revealing tendencies that have taken form. At the same time it is obvious that it is precisely this knowledge that is of special interest for the high-level manager. For only in this case is it actually possible to change over from reactive (reaction to facts that have already been accomplished, frequently negative ones) to a target method of management.

The solution to the problem of utilizing the UIS information supply for revealing tendencies that have taken form during the course of the functioning of the organization is achieved as a result of creating a special analytical group of specialists—a group for analyzing situations who have the right to access UIS information. The specialists of the group were given the task of conducting a systematic analysis of information, revealing existing tendencies, analyzing factors that cause them, and preparing variants of the corresponding management decisions.

The creation and functioning of the group contributes to further improvement of the UIS both in terms of the volume and form of presentation of accumulated information and in terms of the expansion and improvement of service capabilities offered by the system to the users. When the organization has such a group it is possible to single out three sets of conditions for the utilization of the UIS by the person making the decision as the user of the system.

Conditions of operational use. In this case the manager, when making one decision or another (as a rule, of an operational nature) turns to the information supply of the UIS directly from the keyboard of his individual terminal.

Conditions of use through an intermediary. One resorts to these conditions in cases where they are preparing to discuss a certain problem at a special conference or in order to prepare one reference work or another for a manager. In this case, the request is formulated arbitrarily (verbally or in writing) and the corresponding specialist (or a group of specialists) of the group for analyzing situations prepares the information using the capacities of the UIS.

Conditions of strategic utilization. These conditions correspond to the aforementioned methods of access by specialists of the group to the UIS database and ASUP information, but they use it for preparing periodical summary analytical surveys for the manager.

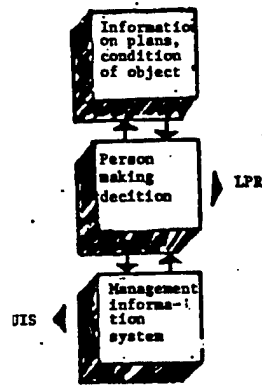


Figure 2

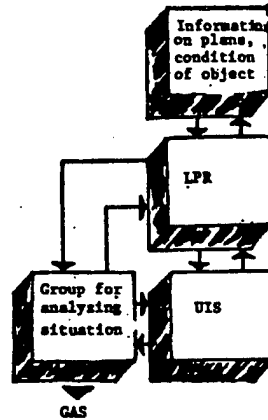


Figure 3

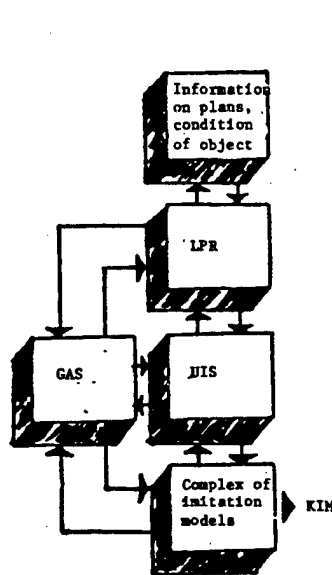


Figure 4

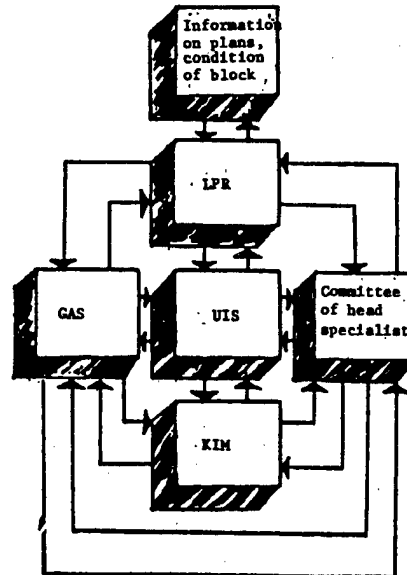


Figure 5

Information Exchange Design in a Man-Machine Management System

With the appearance in the structure of the organization of a group for analyzing situations the diagram of the information exchange acquires the form shown in Fig. 3.

The creation of the UIS, the organization of the group, and the development and introduction into management practice of organizational-legal documentation that regulates the actions of managers as people who make decisions solve, to a certain degree, the problem of their information supply. But all this is correct regarding information pertaining to past periods of the activity of the organization and planned assignments for the future. Yet in each act of making a management decision there

arises a question of the kind: "What will happen if...?" The answer to it can be obtained either through experiment (in organizational-economic systems, as a rule, this is difficult) or intuition, as a result of experience accumulated through past activity, that is, the degree of competence and talent. (The variant—expert evaluations—is essentially collective intuition!). Keeping in mind what has been said above about the ever-increasing cost of decisions (and mistakes), this situation with respect to predicting the consequences of decisions becomes less and less acceptable. Yet the methods and the mathematical apparatus created by modern applied mathematics which has been given the name methods of

imitation modeling make it possible in many cases to obtain a sufficiently correct answer to such questions.

Thus it is the methods of imitation modeling and the creation of complexes of mathematical models that describe the most typical situations in the activity of the organization that should become the instrument that augments the capabilities of the UIS and puts in the hands of the person making the decision information concerning the condition of the objects of control which it will reach in the event that the prepared decision is made. Like the UIS itself, the complex of imitation models should be created consistently and should be constantly growing, encompassing an ever-larger range of situations and indicators of the activity of the organization. The diagram for information exchange taking into account the complex of imitation models acquires the form depicted in Fig. 4.

As has been pointed out, the complex should be created for utilization in a man-machine dialogue. In this case it is possible to develop alternative decisions as in a business game. Participants in such a procedure for developing decisions can be not only specialists of the group for analyzing situations, but also main specialists and managers of functional services. The participation of the latter in the utilization of the complex of imitation models as an instrument for developing decisions is extremely desirable since it develops in them the psychology for decision-making on the basis of the principle of alternatives which recognizes the desire for maximum reduction of the degree of uncertainty.

The principle of reducing the degree of uncertainty at times of developing and making decisions, which is achieved as a result of system information support, should in general be regarded as one of the decisive ones in improving management activity. But even when there is a group for analyzing situations in preparing analytical surveys that reflect the dynamics of the functioning of the organization, it is difficult for the top manager and, in a number of cases, unrealistic, to single-handedly play the role of the person making the decision. It seems expedient to have a board discuss the possible alternatives and develop the final decision. In order to provide for great mobility, it is expedient to create under the top manager an advisory agency which would include 3-8 of the head or leading specialists, depending on the structure and nature of the activity of the organization. This organ, which we shall call the committee of head specialists, being sufficiently mobile, can play a significant role not only when forming the strategy for the functioning and development of the organization, but also contribute to the creation of a spirit of unanimity among the top-level managers. Practice has shown the actual usefulness of creating such an advisory organ in the structure of management. The diagram for information exchange in this case acquires the form depicted in Fig. 5.

The experience in management activity under the conditions of the functioning of the UIS and the availability of

a group for analyzing situations as well as a committee of main specialists shows that system information support contributes to improving organization and management as a whole.

When the concept of the system of information support and information exchange described above (according to the diagram in Fig. 5) is realized, it becomes quite feasible to relieve top managers of the task of solving under conditions of reactive management the majority of questions of current activity for delegating the responsibility for their solutions to lower management levels. Here the system nature of information support and the conditions of direct dialogue with the UIS provide the manager with the opportunity to take control over the state of affairs, including current affairs, but without intervening in minor affairs and undermining lower managers.

In conclusion let us try to formulate the most significant points which when accounted for, in our opinion, can contribute to increasing the effectiveness of the work for creating and improving the ASUP.

It is necessary to change over from automating individual functions (mainly of a planning and accounting nature) of workers of the management sphere to extensive utilization of automated work places and better, informationally supported technology for most management personnel of shops and functional divisions with respect to a broad range of functions.

On the basis of the new informational and technical possibilities realized in management with the help of local networks of computers automated work places for managers and conditions of remote access, it is necessary to significantly develop the analytical basis in management activity.

It is time to provide for a real changeover to paper-free technology and management, and this means to a revision of existing legal and other norms and provisions that require "paperwork" on every occasion.

It is useful to develop and realize methods of integration of the ASU at various levels according to various criteria: organizational, informational, technical and so forth. On this basis one can change over to the creation of comprehensively automated production not in order to automate for the sake of automation, but on the basis of economic expediency and harmonious intercoordinated improvement of both basic material production and the organizational and economic systems for controlling it.

Finally, it is necessary to carry out consistent improvement of organizational and management structures taking into account the provisions and requirements ensuing from the changeover to integrated ASUP's (the formation of a group for analyzing situations, bureaus for program-target methods of management, a committee of head specialists, and so forth).

The managers and a wide range of leading specialists employed in management the most important task, in our opinion, is to develop and steadily implement a strategy of utilizing the growing possibilities of computer equipment in all spheres of production and management. In places where this is carried out on the basis of a careful technical and economic analysis and the utilization of the program-target approach, it will undoubtedly be possible to achieve a real acceleration in increasing the effectiveness of production.

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Managers To Engage in Dialogue With Computers

18200222g Novosibirsk *EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO)* in Russian No 7, Jul 87 pp 81-94

[Article by A. V. Molodchik, candidate of economic sciences, dean of the special faculty for retraining management personnel at the Perm Polytechnical Institute, and V. N. Kobelev, deputy chief of the division for ASUP of the Motorostroitel PO imeni Ya. N. Sverdlov (Perm): "The Manager and the Personal Computer: How To Arrange a Dialogue?"]

[Text] Labor productivity is determined to a significant degree by the effectiveness of the implements of labor, the instruments. The labor of the manager, the production organizer, is perhaps the most conservative in this respect. During the past 30 years in industry there have been several generations of machine tools and we have already entered upon the creation of flexible automated productions with elements of technology that does not involve humans, but the productivity of management labor has changed quite insignificantly during this period. The hopes we have placed in ASU's and large computers have not yet been justified. The explanation here is simple. While in physical work the instruments are prepared for a specific object or even a specific worker, in the labor of the manager this is also important and necessary. Unfortunately, on the whole large computers have turned out to be too cumbersome and costly for such individual adjustment for these specific tasks of each plant service, especially taking into account the psychology and style of management. Where is the solution?

The rapid progress in the development of computer equipment even now is changing our ideas about the possibilities of automating management labor. Automated work places (ARM) for the technologist and design based on relatively small computers are becoming commonplace at enterprises. The appearance of personal computers (PC) will make it possible to realize not only

the concept of universal computer literacy, but also a mass policy of changing over to the creation of automated work places for the manager.

In the next few years many of us will acquire a personal computer for our desk at home. But, of course, the very fact of its appearance will not solve all the problems. The computer is still only a machine and it takes a human to control it. And this machine as distinct from many that help man previously, has a unique property—it flexibly adjusts to the individual peculiarities of each of us, helping us to create new knowledge, instruments and mechanisms and to control production.

The application of personal computers makes it possible to change over to the introduction of software systems for management decisions (SSMD), whose basic task is to give the manager complete and objective information about the condition of production in convenient form and at any point in time. This will make it possible not only to achieve savings on labor, but also—the main thing—to significantly improve the quality and effectiveness of management decisions.

What Is the SSMD?

The SSMD is a totality of elements of the man-machine system to which the manager turns in a dialogue during the process of making management decisions. There have already been attempts to create these systems on the basis of large computers with terminal stations hooked up to them. But only the "intelligent" terminal, that is, the personal computer, can be completely "compatible" with the manager.

When creating an SSMD it is very important to quickly overcome the manager's psychological barrier against the computer. To do this in the initial stage one forms minimum requirements of the SSMD whose implementation makes it possible to receive practical results rapidly. Then, as experience is accumulated, the manager himself begins to augment his information system. This principle is conditioned by the fact that the manager in the initial stage frequently cannot and sometimes will not give a complete functional description to the SSMD. Moreover, work with the SSMD can change the manager's ideas about its possibilities and, consequently, the requirements placed on it.

The profession of "manager" like any other has its own general features and, above all, the fact that the objects and the result of the labor are information. If one proceeds from the maximum, here is the list of requirements that could be entrusted to a personal computer.

Manager's Requirements for the SSMD

1. Systematized storage of information
2. Rapid search for necessary information
3. Regular updating of information
4. Correction of stored information
5. Automatic recalculation of secondary data when

- initial information is changed
6. Presentation of output information in visual tabular or graphic form
 7. The possibility of further detailization of indicators in tables
 8. Statistical processing of data for reviewing tendencies and prognoses
 9. Direct dialogue with personal computer
 10. Access to data of other computers
 11. Acquisition when necessary of a documentary copy from the depiction on the screen
 12. The possibility of developing this system

Operational Environment for SSMD

1. Control of data base
2. Compiling of tables and their calculation
3. Construction of graphs and diagrams
4. Word processing
5. Statistics
6. Exchange

Here, as in the case of the goldfish, it is too early to speak about a concrete pond or stone castles. These are mainly conditions which make it possible for the manager to turn to the computer when working with information just as easily as he does to a regular pen, telephone or paper, but significantly more effectively and rapidly. In principle the personal computer even now can provide all these possibilities. To do this it is necessary to have a special operational environment for the SSMD which consists of series of packages of applied programs.

- Storage, search, sorting, selection of information
- Creation of tables with 253 lines x 63 columns
- Automatic construction of graphs and diagrams on the basis of tabular data
- Formation and editing of textual documents
- Statistical data processing for analysis and prognosis
- Provision of interaction between personal computer and any other computer

It is not so simple to teach the computer to do all this. From experience in developing applied software that offers approximately analogous possibilities to the user of the personal computer, one of the firms calculated the need to expend the labor of qualified programmers for 200 man/years. (Footnote 1)

In addition to the general information requirements, each manager's workplace has its own specific tasks and peculiarities. But since in the first stage the task of effective direct dialogue between man and computer has already been resolved, the actual adjustment of the SSMD to the manager is carried out considerably more easily if, of course, this takes place under the observance and with the participation of the user.

Adjustment of the SSMD

1. Determination of the information needs of the manager
2. Arrangement of the logical structure of the database
3. Formation of blocks of initial information
4. Construction of algorithms for processing information
5. Software for calculations and requirements of the manager for the SSMD
6. Change in technology of management
7. Change in the organizational structure, wages, and interrelations

As we can see, the personal computer not only intrudes into the sphere of information processing, but also actually affects the very technology of making management decisions and can require a redistribution of rights and responsibilities, and changes in the organizational

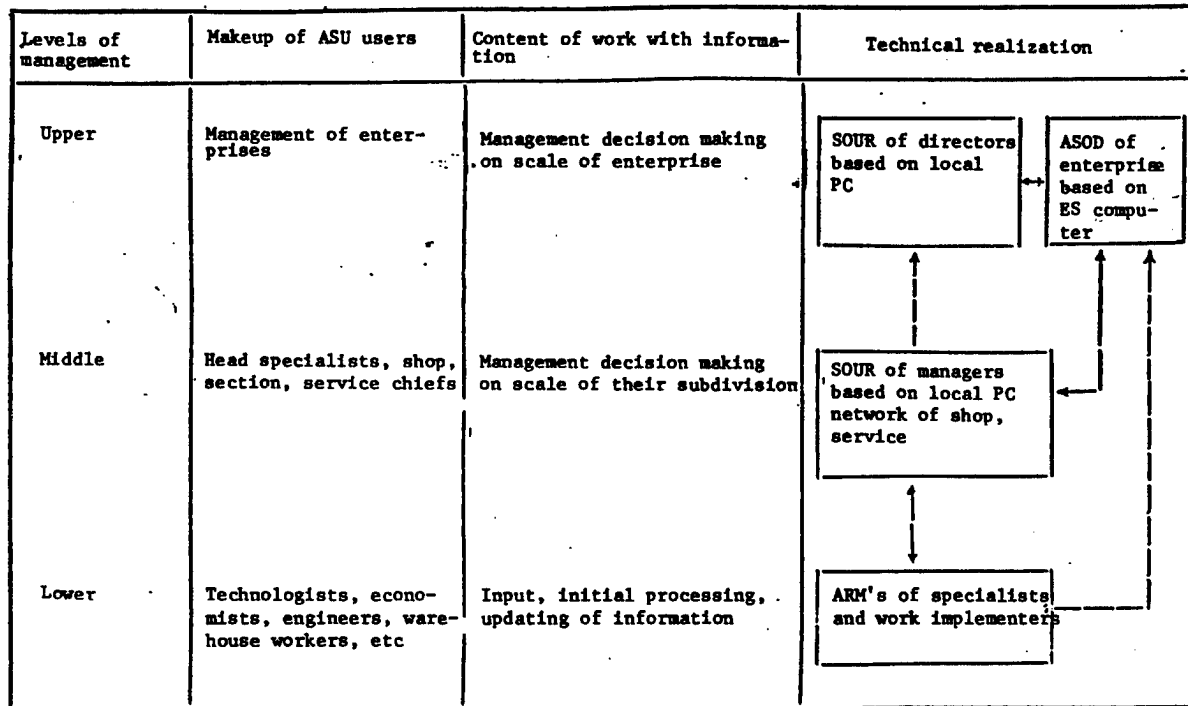
structure, system of payment, and interrelations. It is only a system approach when the final goal is to increase the effectiveness of production and the system includes the entire totality of elements and can lead to complete success.

And later. Many good plans remain just that on paper unless conditions are created which contribute to their introduction. The SSMD is directed toward obtaining information that objectively reflects all the reserves and omissions in production. But is the manager interested in intensive utilization of reserves? The answer to this question might be far from simple. What, for example, is the shop chief interested in if he is placed in conditions whereby the evaluation of his labor is higher the more hidden reserves he has, even to the detriment of the enterprise as a whole.

Another example. According to data from our research, at a number of enterprises the difference between the actual output of products in the shops and the data on the orders is 15-25 percent. This is the result of adjustment of earnings, that is, artificial write-ups. The computer shows all this dispassionately, but it can also be "punished," it can be turned on or broken, and there are great possibilities of this. To make the computers not a trader or an enemy, but a friendly helper—such is one of the tasks in improving the economic mechanism for management at all levels of administration.

Computer Networks

Services and departments of the enterprise operate with close information interconnections. Not a single management decision can be made without accounting for



Multi-level ASU Diagram on the Base of Local PC Networks

the condition and consequences that can take place in adjacent subdivisions. It is complicated and labor-intensive to put this information into the PC each time. It is much easier and more efficient to make changes only in one's own work section, and have the rest of them recognize this automatically and feed it into the PC's of other managers. One of the promising directions for the development of the ASUP is the construction of multi-level local networks. An important place is assigned to the PC in local networks. It is like a distant representative of a large computer and when advising the manager uses both its own "knowledge" and "warehouses" of data from computers of an older level with which they are connected when necessary. Specialists assert that autonomous functioning of individual ARM's of managers on the basis of PC's is hardly expedient. Their real possibilities are revealed only with the creation of local networks of shots and services which are hooked into an already existing computer center. An example of the diagram for such a network and the basic tasks for the various levels of management are presented in Fig. 1.

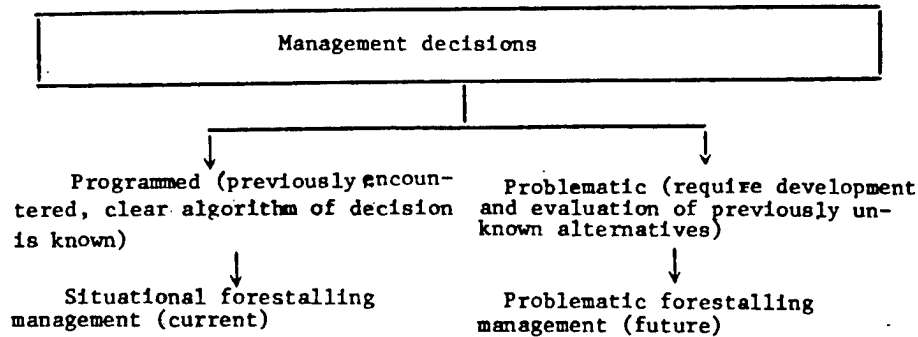
Naturally, in the SSMD one uses all the information and normative base that existed in the ASUP. But the customary concept of construction and development of the ASU must be changed. Its upper level is an automated data processing system (ASOD) which keeps a databank of the basic activity of the enterprise. This level gathers information from the lower levels, verifies it, generalizes it, and issues results both to the lower levels and to the

higher organizations. For its functioning it is necessary to have a fast computer and large volumes of internal and rapid external memory. At this level there is no need for complicated dialogue software, but it is necessary to have permanent programs for mass data processing. Therefore it is expedient to utilize the existing equipment of the computer center, that is, the older models of YeS computers.

The average level of the system is the internal local networks of shops, services, departments, and sections. The most important function at this level is the coordination of the work of the ARM's and SSMD's of the lower level, the generalization of the result, and the exchange of data with the ASOD. This level can be realized with 16-K PC's with 5-10 megabyte Winchester hard disks.

The lower level is oriented toward gathering, registration and preliminary processing of information concerning material flows and the condition of resources at the enterprise. This includes for the income and expenditure of materials and batching items, the movement of parts, the dispatch of the prepared products, and so forth. Inexpensive 8-K PC's can be used at this level.

Let us now consider how the content of management activity itself should change under conditions of the man-machine system of preparing and adopting a decision.



More Rapid Situational Management

All the diversity of management activity from the standpoint of the manager's reaction to production situations that arise can be reduced to two cases which are presented in the drawing.

Thus the administration can be "more rapid" (directed toward eliminating the causes of the problems) and "in arrears" (directed toward eliminating the consequences of the problem). In management a shortage of time or resources is reflected in the production rhythm, savings, and labor productivity. More rapid management, conversely, is constructed according to the principle of preventing shortage and, consequently, it is more effective.

Despite the obvious advantage of having management take the lead, there is still a large proportion of management decisions that are made after the problem has manifested itself. Thus, for example, so far the shop chief of a machine-building enterprise makes from 40 to 80 percent of his decisions concerning "burning" problems. This is also shown by the fact that in a number of plants 10-25 percent of the parts necessary for assembly are in short supply.

There is no doubt that it would be wrong to think that the shop chief or director is opposed to having this solution precede the problem. But what causes them to manage "according to the shortage"? Here many people give factors that are beyond their control: the lack of materials, the shortage of people, the failure on the part of associates to fulfill agreements, and so forth. While understanding the entire complexity of this problem, still let us try to single out a number of factors that impact it:

1. Working conditions.
2. The style and methods of management.
3. Methods of preparing for decision making.

By working conditions we mean those social and material interests which motivate each organization and each individual worker to creative, imaginative, and effective work. All the latest economic experiments in the country

are directed primarily toward developing the economic mechanism, which places managers of any level in conditions that motivate them to strive for preventive control.

The style and methods of management are the most conservative elements when introducing any innovation. This is linked to the need for changing man's behavior, his habits, and even his nature. The changeover to principles of preventive management in and of itself, and the more so with the application of modern computer equipment requires new elements of the style and methods of management.

While the first two factors are largely conditions for changing over to progressive methods of management, the technology for making management decisions performs the role of the material basis. In general one can single out two types of management decisions.

This division is undoubtedly arbitrary. As they are repeated, problem decisions can change into programmed or standard decisions, and vice versa. The ratio between programmed and problem decisions depends on the degree of uncertainty of the conditions in which the enterprise or organization is operating.

In long-range preventive management the object is the planning of innovations and, as a particular case, the elimination of factors that regularly cause deviations in production. The stages of long-range preventive management can be: the search for causes of deviations, the development of alternative variants of the solution to the problem with an evaluation of the achievement of the goals and the risk of realization, and the development of a plan of measures for implementing the decisions taking into account the possible deviations, and the preparation of resources for preventing or reducing the consequences. As a rule, it is difficult to formalize this type of management decision and here one uses logical methods of preparing decisions and analysis of problems based on the principles of the system approach.

Current preventive management is characterized by maintaining the parameters of the production process within the range of acceptable deviations. To do this it is

necessary to determine the limits of deviations for all resources and the control points for changing over to situational management to eliminate deviations. The principle of situational management consists in determining a logical system and sequence for considering and analyzing information that helps to make the most correct decision which would make it possible to reduce losses to a minimum or prevent undesirable deviations. The realization of the principle of situational preventive management is possible through the creation of an SSMD on the basis of a PC.

A principally new aspect for the manager here is the partial changeover from the traditional system for obtaining and analyzing information by going through journals and documents, using a telephone and verbal questionnaires, to a dialogic man-machine system in which one has previously determined the production situations, the efficient way of preparing decisions concerning them, the amounts of allowable deviations, and the most effective form of submitting information.

The creation of a system of situational management on the basis of a PC requires preparatory organizational and planning-technical work in the following stages:

1. Determination and organizational formulation of the basic management situations that repeat themselves.
2. The determination of the logical sequence and content of the minimum necessary information for preparing a decision concerning the situation.
3. The development of the technical, program, and algorithmic software for the SSMD on the basis of the local PC network.
4. The development of organizational-legal documentation for situational management (procedures, provisions concerning incentives, interrelations).
5. The development of behavioral habits in situational management in the form of a business game.

An Example of Solving the Situation "Repair"

In Perm in a special academic department for retraining management personnel during the first two years they work out individual elements of the SSMD based on the PC. For the first time they gave a 20-hour course entitled "The Personal Computer in Production Management." With the participation of the students using a Pravets-82 PC they created a number of operating models and elements of the SSMD for the shop chief. As an example let us compare the traditional manual and the dialogue system for resolving a situation: "Twenty-percent loss of productivity of machine tool with numerical program control."

The traditional diagram for resolving a situation. Alternatives: from "repair immediately" to "run it until it completely breaks down". The technology for preparing the decision:

1. An operations conference with the participation of the shop mechanic and the adjuster in order to clarify

the reasons and possibilities of eliminating the malfunction (15-20 minutes).

2. The issuance of an assignment for overtime work in preparation of an order for working on the third shift (10 minutes, telephone).
3. The acquisition of information from the section chief concerning the list of items produced on this machine tool, the output plan, and the coefficient of loading of the machine tool (10 minutes, telephone).
4. The acquisition of information concerning the possibility of adjusting a machine tool of the same type in another shop (20 minutes).
5. The adoption of the decision.

The overall amount of time is about 50 minutes, but the information that is obtained is incomplete and unreliable since from it it is difficult to evaluate the entire volume of necessary work, there is no analysis of statistics from preceding malfunctions, the coefficient for loading does not take into account the dynamics of the down time, and the information about equipment of the same type is unreliable.

In a real situation a decision was made to work until the machine completely failed, which led to an interruption in the fulfillment of the plan because of the need to replace a hydraulic cylinder which could not be found in the warehouse. This is a typical example of resolving a situation under the conditions of "shortage."

The SSMD "repair." Fig. 2 shows the logical sequence of the dialogue and the SSMD "repair" which is carried out on a Pravets-82 PC using packages of applied programs. It took 7 minutes to make the decision. And the very decision "repair on the 20th. The parts are to be temporarily transferred to Shop No 4 with the creation of a reserve of 350 units" realizes the principle of preventive management and precludes losses in production.

The work of the manager with the PC in the situation "repair" is carried out through the "menu" (Fig. 3). The software makes it possible to bring on to the screen, in keeping with the situation that has arisen, a catalogue of existing information forms and also to provide more details for the indicators of individual tables. When creating local networks the situation is evaluated on the basis of the availability not only of one's own resources but also those above the subdivisions.

Having the possibility of obtaining reliable and complete information, the manager can make a correct decision, and the PC makes it possible to introduce his data and play out the possible consequences of this decision. The form in which the information received by the manager is depicted on the screen is very important. It can be sound, color depiction, graphs, or tables. For example, if because of inadequate qualifications a manager makes a decision to "work until complete breakdown," the computer program can be constructed so the screen will show a picture of a machine breaking into pieces accompanied

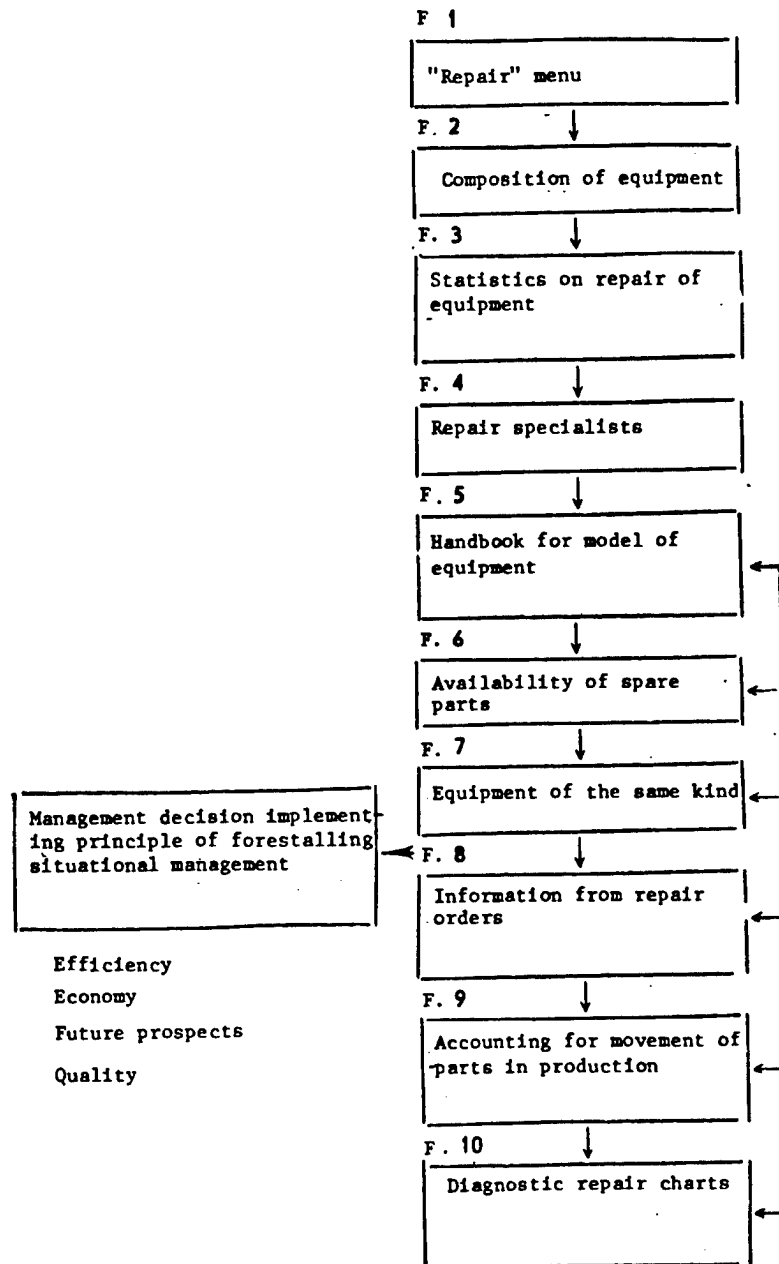


Figure 2: Logical Flow of the SSMD "Repair" Dialogue

by an appropriate melody. Thus the manager learns with the help of the SSMD and during the process of work can develop it and change the program.

One of the main advantages of the SSMD is its flexibility. Above we have given the necessary composition of the information need in a specific situation. But for a specific person certain information will be less important and other information will be extremely necessary.

The PC makes it possible to rapidly adjust to the specific information need of the manager, which he formulates on the basis of his qualifications, psychology, and management style.

Basic Conclusions

The personal computer can be an effective mass instrument for the manager. As distinct from large computers

F.1 REPAIR MENU

1. Planned-preventive repair
2. Current repair
3. Emergency repair
4. Capital repair
5. Modernization
6. Inspections

Indicate number for your selection

F.2 Availability of equipment in shop I

Model of equipment	Quantity
1. ATPR-800N	2
2. PT-75103	1
3.
4.

Indicate number for your selection

F.7 Availability of equipment of same type and its loading

Machine tool RT 75103

Shop I	Quantity	Coefficient of daily ld
1	1	0.8
2	0	0.45
3	0.2	0.73
4	0.2	0.15

Figure 3: Principle of the "Repair" Menu in SSMD

the PC has the possibility of rapidly adapting to tasks of a specific work place, style and methods of management of a specific manager.

Effective operation of a PC is expedient and possible only with packages of applied programs for general purposes for all managers.

The qualitative development of the ASU must be oriented toward the creation of local computer networks with exchange of information among data banks.

When introducing personal computers, one should devote special attention to changing the technology for preparing and making decisions, and particularly change over to situational preventive management.

It is possible to overcome the psychological barrier and utilize the PC effectively in those organizations where the managers are really interested in efficiently utilizing available resources.

Footnote

1. "Instruments, Means of Automation and Control Systems. Survey Information," Series TS-2, Issue 6, Moscow, 1984.

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Prices Important in Socioeconomic Development
18200222h Novosibirsk *EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO)* in Russian No 7, Jul 87 pp 95-113

[Discussion by Yu. V. Borozdin, doctor of economic sciences, Central Economics-Mathematics Institute of the USSR Academy of Sciences (Moscow): "Prices, Intensification, Effectiveness"]

[Text] The radical restructuring of the economic mechanism that is being carried out in keeping with the decisions of the 27th CPSU Congress involves all units of management of the economy and serves a single end—acceleration of the country's socioeconomic development. The entire system of methods of directive planning, economic levers, and incentives should contribute to changing the economy over as rapidly as possible to the path of primarily intensive and effective management in achieving the highest final results. It is difficult to overestimate the role of prices and price setting in solving this problem.

It says in the political report of the CPSU Central Committee to the 27th Party Congress, "It will be necessary to carry out a planned restructuring of the price system as a unified whole in the interests of arranging for effective cost accounting and in keeping with the tasks of increasing the real incomes of the population. It is necessary to give prices greater flexibility and to coordinate their level not only with expenditures, but also with the consumer qualities of products, the effectiveness of items, and the degree of balance between the products that are produced and the public needs and demands of the population. It is intended to utilize limit and contract prices more extensively." (Footnote 1)

The articles published in EKO as discussions by A. M. Birman, "Tons, Pieces, Rubles," D. V. Valovoy, "Specialization and Sales," and G. A. Kulagin, "Products List, Price, and Profit" are devoted to the most crucial and pressing problems of planning, economic stimulation and evaluation of the performance of production units in industry. The essence of this discussion, as G. A. Kulagin quite correctly pointed out, amounts to the question of prices and price setting since prices are the only instrument for comparing expenditures and the results of public production. And here no physical indicators (pieces, meters, tons) or truncated value indicators (for example, the normative net output) can give a complete picture.

What did G. A. Kulagin see as the key to solving the problem? Strict state control of the prices and price setting. Of course this control is necessary, but it must be exercised in a broad, all-encompassing and effective way. But in and of itself control is an administrative lever and unless all the economic causes of an unjustified increase in prices are revealed and eliminated, punishing the parties guilty of violating the policy for establishing and applying prices will recall (and does recall!) the fight against speculators in trade when there is a shortage.

So what can be the economic basis for effective control over prices and price setting? In our opinion, only the active participation of the consumer in the process of price setting. But this, in turn, requires a significant restructuring of the system of financial relations in the national economy that all levels in the direction of gradually changing over to self-financing of all branches

and the largest possible number of associations and enterprises of the sphere of material production. Speaking of the idea of self-financing, G. A. Kulagin had in mind not only the possibility of forming at the enterprises funds for expanded reproduction sufficient for their self-renewal, but (and this is perhaps the main thing) the possibility of purchasing capital for their "vital," hard-earned money. Only under these conditions will the enterprise not be indifferent to the price level of the products they require and begin to bargain about the price with the manufacturer. But still this requires a market of means of production, that is, a changeover from strictly funded distribution of them to wholesale trade. Only then will it be possible to provide for real participation of the consumers in the process of price setting and their transformation, as contracting agents in commodity exchange, into an effective means of control and "pressure" on the manufacturing enterprises under whose dictatorship the process of price setting now takes place.

But what about the price-setting agencies, which it would seem should implement the unified state policy in the area of prices? They are now essentially organizations (central, republic, local) which only record the actual production outlays, while making, to be sure, certain corrections to make them stricter, thus giving more weight and significance to their activity. But the manufacturers, knowing this direction and the work of the price-setting agencies, as a rule, have the possibility of including in the draft of the price that is submitted a certain "reserve" that is intended to make up for these adjustments.

Since practically any change in prices is taken into account in the estimates of expenditures and financial plans, it is quite obvious that the consumer enterprises not only do not give opposition to price increases (substantiated or not) but even derive an advantage of their own from this since they can increase the volume indicators of their activity without any effort. It is even more advantageous for financial agencies to increase prices since this gives them the opportunity in many cases to accumulate a large amount of profit in the budget. And reducing prices for products that have many consumers is disadvantageous to the financial agencies, since it is technically an extremely complicated task to "collect" the price reductions for the consumers and then reduce the sum of their financing by the corresponding amount.

But how do planning agencies react to price dynamics? Their position is like the position of financial agencies and manufacturing enterprises since a high level of prices provides for good volume indicators of the growth of the total social product, the national income, the output from various spheres of material production, and so forth?

And so it turns out that the existing economic mechanism, which is based on volume value indicators and the principle of planning from the level that has been

achieved, has a system of prices and price setting that corresponds to it completely. So in this case who can exercise strict control over prices and price setting?

Let us begin with the problem of labor normatives "as a firm basis for price setting." There is no doubt that good normative management is no small factor in all economic accounts and above all accounts for expenditures, but it is certainly not the only and exhaustive aspect. Expenditures should still be compared with something and this "something" can only be the useful result obtained by the consumer of the resource or product. The useful result is the total savings on live and embodied labor obtained in the sphere of consumption. Moreover labor expenditures are only a part of production expenditures and regardless of how well they are calculated they cannot give a complete idea about actual expenditures. This cannot be given by the normative net output (NPCh) either, which reflects the actual expenditures of the enterprises, since it is the "truncated" part of the overall production expenditures as the expenditures of live and embodied labor. To operate with indicators that are known to be incomplete and consider them a firm basis for price-setting means to distort the very nature of the planned price in the socialist economy, whose level should characterize the useful effect of products, that is, their contribution to increasing the final national economic result.

If one is to proceed from the cost-cutting essence of the price, the problem of the so-called equal advantage becomes artificial and fabricated. Indeed, equal advantage for whom? For the national economy there cannot and should not be equally advantageous products, for the true meaning of economic development consists in the proliferation of national wealth, which is achieved the more rapidly the more material goods are created with the greatest social usefulness. The same criterion should exist for all production units. But since it simply cannot be realized in practice in cost-accounting indicators for evaluating the work of the enterprises, suggestions are generated concerning the creation of a mechanism for "indifference" to the list of products that are produced, which is given centrally to the enterprises and associations by the planning agencies.

But is it possible to provide for real equal advantage from production for manufacturing enterprises even with respect to such a criterion as internal labor expenditures? Under the conditions of many kinds of productions this task is practically impossible since the labor-intensiveness of items differs and in order somehow to neutralize the effect of the "base" it would take repeated differentiation of normatives of profitability and their transformation from normatives into individual indicators. And to have individual normatives of profitability for each item means also to have individual prices which, under these conditions, can in no way be considered the public normative of expenditures and will rather be essentially turned into an accounting category. And

then what are normative expenditures under the conditions of the current economic mechanism, even if they are taken completely as expenditures of live and embodied labor? At best they are average branch expenditures on products manufactured at a number of enterprises. But under the conditions of narrow object specialization they can easily be used to adjust the actual expenditures under the name of planned expenditures, that is, taking into account the possible savings on material and labor expenditures, and in extremely moderate amounts. In essence these expenditures will be the actual ones which reflect the real conditions of management at one enterprise or another.

Of course the state can exercise no real control over the price level under these conditions. Moreover, the manufacturing enterprises will satisfy their price interest to an even greater degree than they are doing now.

Where is the solution? It seems to us that we must look for it in the area of radical restructuring of the methodology and practice of price setting and reorienting them from the expenditure approach to the approach from the standpoint of effectiveness, national economic significance, and product quality. Only this will completely correspond to the course taken by the party toward intensification of public production and sharp acceleration of the rates of scientific and technical progress.

At the same time one must keep in mind that the current practice of price setting has taken form historically over decades of mainly extensive economic growth. There is a principle that is typical of this kind of growth: the more one spends, the more one receives. Of course we are speaking about expenditures of resources of identical quality and the receipt of identical products. Since everything was determined by quantitative increases, multiplying the expenditures of labor, material and financial resources provided in practically the same measure for the multiplication of the results of production in the form of an additional quantity of coal, steel, machines, consumer goods, and so forth. In practice we were equating expenditures and results for an economy of the extensive type which has undergone no serious qualitative changes.

The need for quantitative increases in production completely overshadowed the problem of the quality and effectiveness of the utilization of products and all production resources. Moreover, under the conditions of a shortage of fixed production capital the economic problem of better, maximally effective utilization of them did not even come up for each ton of ore and steel, each machine tool or tractor was immediately "put to work" and it is no accident that the slogan "We use equipment up completely" was so widespread. Now the saturation of the economy with means of production has assumed such a wide scale that the problem of their effective utilization has become one of the primary national economic problems. A sufficient quantity of labor

resources and their generally low professional and technical level made it possible to solve many of the problems of our economic growth "not by ability but by numbers," and this also made the problem of effective utilization of labor resources not seem crucial for a long time. All this shows that our production potential, up until the middle of the 1960's, was relatively small and therefore the prevalent task was not so much its qualitative improvement as its quantitative growth.

Prices of means of production, which were established (up until 1977), according to the formula: production plus minimum profit (3-5 percent of the production cost)—corresponded completely to the economic mechanism in existence at that time since they were essentially only an instrument of public bookkeeping, that is, they reflected the level of existing current production outlays. The very task of utilizing prices to select optimal economic decisions and evaluate the effectiveness of planned variants of the development of the economy seemed to our economic practitioners and the majority of economic scientists not to be in keeping with the essence of the socialist system.

The expenditure mechanism of management and the expenditure prices inherent in it under modern condition sacrificed to volume value and physical quantitative gross indicators the task of comprehensive intensification of public production, progressive structural changes, restructuring of the policy for capital investments, more effective utilization of existing production resources, and so forth. This mechanism has entered into contradiction with the requirements of scientific and technical progress and therefore is in need of improvement in all of its constituent parts, including, of course, price setting.

What is the main stumbling stone in the system of prices and price-setting now? It is first of all the principle of so-called normative profitability which is set either for complete current expenditures or for some part of them: wages, production cost minus expenditures on raw materials, processed materials, semimanufactured products, and so forth. The utilization of this principle considerably facilitates the work of setting prices and reduces it essentially to a calculation procedure, for it is sufficient to "adjust" the actual profitability to the normative in order for it to become clear in which direction and in which amount the prices should be changed. The fact that the actual profitability is considerably higher than the normative is used as an "irrefutable" argument for reducing the price; the opposite situation provides justification for the manufacturers to raise the question of increasing prices to price-setting agencies. These are the limits in which the arguments over prices usually occur.

As we can see, here too there is the principle of the "base" which has only a somewhat unique price manifestation. It is important for manufacturing enterprises to keep the level of expenditures such that it does not entail a price reduction.

The normative of profitability, which is established in terms of expenditures, by its very nature is in no way linked to consumer value or the useful effect of the product. It turns out that the profit made from an item depends not on the amount of its effect in the sphere of consumption but only on expenditures (even if they are internal, that is, elements of past labor have been eliminated from them) in the sphere of production.

With this approach discussions of socially necessary labor expenditures as a base for planned prices become nothing more than good wishes because nobody establishes the measure of the social necessity of the expenditures that are made. An extremely simple logic is in effect here: once the item is produced or its output is planned, this means that somebody needs it and therefore the actual individual expenditures on it are socially necessary and should be recognized in the price.

The question can arise: is the output of products really not linked to orders from consumers and the satisfaction of their needs? Of course it is. But this link is frequently unique. Formally it seems to come from the consumer, but actually it frequently comes from the producer, who produces not what or exactly what a specific consumer needs, but what he himself can produced.

In our opinion, the only expenditures that can be considered socially necessary are those that are made within the framework of satisfying a particular social need. Unless one measures the social need and the degree of its satisfaction one cannot even speak about socially necessary expenditures. And the needs, in turn, are satisfied by consumer values, which predetermines the extreme importance for economic science of the investigation of the essence, the criteria for evaluation, and the methods of measuring the social consumer values (social usefulness) of goods. Moreover, if when analyzing the social consumer value of any individual product one pays attention only to the fact that it was produced "for others" and has some fixed set of useful properties, the social consumer value of a certain mass of products intended for satisfying various needs is strictly dependent on the degree of satisfaction of these needs: "If the consumer value of an individual commodity depends on whether or not it in and of itself satisfied some need, the consumer value of a certain mass of social products depends on whether or not it is adequate to a quantitatively determined social need for a special kind of product and, consequently, whether or not it is proportional and whether or not the labor is distributed among the various spheres of production in keeping with this social, quantitatively determined need." (Footnote 2)

From this one can draw the conclusion that any disproportions between production and needs directly influences the amount of social consumer value and then the following typical situations are possible. First, if the product does not satisfy any social need or is produced in excess of the social need, it does not have consumer value. Second, if the product is produced fully in keeping

with social need then it has social consumer value in a specific fixed amount. The ranking of the amounts of consumer values of various kinds of products for this situation can proceed according to the principle of "more-less." Third, if a product is produced in a quantity less than the social need for it, its social consumer value increases by the amount by which this need is not satisfied. But the determination of the numerical measure of this lack of satisfaction and, correspondingly, the amount of social consumer value is possible only on the basis of clear-cut quantitative methods of measuring the actual social needs for a mass of products of one kind or another, which has not yet been achieved either by economic theory or by management practice, but in and of itself is undoubtedly an important task for research. "Since the commodity is purchased by the consumer not because it has value but because it has 'consumer value' and is consumed for particular goals, it goes without saying: 1) that consumer values are 'evaluated,' that is, their quality is investigated (in exactly the same way as their quantity is measured, weighed, and so forth); 2) that when various grades of commodities can replace one another for the same purposes of consumption, preference is given to one grade or another." (Footnote 3)

The social consumer value, both in terms of its overall mass and in terms of the structural cross-section, is a final national economic result of public production. Therefore the orientation of the socialist economy toward the achievement of the highest final results of production presupposes maximization of the social consumer value with the most efficient and effective utilization of all production resources. The greater the degree to which social needs are satisfied, the better one should consider the results of public production to be. The influence of prices on the intensification of production and its increased effectiveness is linked to a correct reflection in them primarily of the amount of social consumer value and useful effect of the product, in other words, the contribution made by the product to increasing the overall national economic result of production.

How is this requirement meant in practice when determining planned prices? It is necessary first of all to single out three groups of products in keeping with the accepted political economic classification —objects of labor, means of labor, and objects of consumption. All of these play their own specific role in the system of public reproduction and are characterized by the fact that the objects of labor are simultaneously consumed in the process of production, means of labor serve for a more or less lengthy period of time, and objects of personal consumption, once they are sold, leave the sphere of economic circulation.

Objects of labor (raw materials, processed materials, fuel and so forth) manifest their social usefulness only in the production of means of labor and objects of consumption, and therefore their socioeconomic and ecological effect are manifested only in those products on which they are expended. Proceeding from this, the price of one

object of labor or another is determined as a part (proportion) of the total effect provided by the product in whose production the object of labor is utilized. For example, coal is burned at the TES in order to obtain electric energy. The price of the coal is a part of the price of the electric energy and by no means is it the cost of extracting the coal itself plus the normative profit.

Since, as a rule, there are always several spheres of application of a given object of labor, all of them should be ranked according to the level of effectiveness and as an initial price one uses the part of the total effect of the product that is contained within the application of a given object of labor. In the closing sphere, at which level resources and needs for a given object of labor are balanced, the effect of its application will be less and therefore the price will be less than for any other sphere preceding the closing one.

When expanding the production of a given object of labor and including new spheres of its application with an increasingly lower amount of effect, the price will decrease correspondingly. The opposite situation is also to be expected, in which because of the limited and rare nature of one object of labor or another and also the reduction of the spheres of its application because of the reduction of the amounts of production, the closing sphere will shift in the direction of the greatest values of the effect from the application of this implement of labor and the price should increase correspondingly.

For clarification let us consider a simple hypothetical example. Coal is used as a valuable organic product with an effect of 30 rubles per ton (first sphere of application) and as fuel with an effect of 15 rubles per ton (second sphere). If the coal resources are sufficient to cover the needs of these two spheres, the closing sphere will be the second one and the price will be established at the level of 15 rubles per ton. If the coal resources are sufficient only to satisfy the needs of the first sphere, the price should be set at the level of 30 rubles per ton and thus there will be an economic "weeding out" of the second sphere. If, further, the coal resources are greater than the needs of the first two spheres, some third sphere can be included with an effect of the utilization of the coal, say, of 10 rubles per ton. Then the price of the coal is reduced to 10 rubles per ton.

Thus there is a balancing of supply and demand and in coordination of the price with the effectiveness of the utilization of the product. The closing sphere is considered to be the one whose needs can still be satisfied by the existing resources and in which the utilization of the product produces a positive effect.

For means of labor one uses the same approach with the exception that the prices determined by the amount of the total effect including the time factor received by the consumer during the period of service. This effect is reflected by the savings on live and embodied labor in all planned spheres of the application of the means of labor,

but the prices determined by the amount of the effect in the closing sphere of application. Here also one achieves a coordination of the price level with the existing balance of resources and needs and it is possible to fully realize the principle of graduated prices that change taking into account the satisfaction of the needs of the planned spheres of application with the declining effectiveness. As production expands and the products are used in more and more new spheres, the price will decrease.

For objects of consumption it is possible to determine the quantitative values of the effect only for certain groups of commodities, mainly those for cultural purposes. Of course the consumer should be aware of characteristics such as savings on electric energy, sizes, weight, and so forth, but the decisive thing in determining the price should be the amount of the consumer demand. It is precisely in the demand that one registers the effect of the objects of consumption, and the price, which balances supply and demand, fully corresponds to the principle of accounting for the social usefulness of consumer values in price setting.

The proposed methodological approach is also the antipode to expenditure price setting whose essence is the greater the production expenditures, the higher the price. To be sure, under the modern conditions of the deep restructuring of the economic mechanism the prominence of the expenditure method of determining prices are trying somehow to adjust it, as it were, to bring it in line with the demands of the time. They assert that the practice of price setting now takes into account not only expenditures but also the consumer properties of the goods, their quality, and the economic effectiveness, that there is a widely applied system of increments to prices if they have high quality and effectiveness, and that prices are generally determined by the tabular method depending on the existence (lack) of various parameters of the item that reflect their consumer properties. All this is true. But production expenditures (and not the effect in the sphere of consumption!) are, as before, the basis of the price. Increments for effectiveness and quality, being a "makeweight" to the expenditure price, do not solve the problem of accounting for the socioeconomic effectiveness since they are determined by a percentage of the same price, and the calculated consumer effect, paradoxical as it may seem, is determined by the manufacturer and he must only formally coordinate this with the consumer. Is there any need to say that the manufacturer has plenty of opportunity to raise both the level of his production expenditures and the amount of the calculated total effect for the consumer by submitting his own projected price to price-setting agencies.

The fact that the manufacturers extensively take advantage of this kind of write-up is also shown by the work practice of price-setting agencies where the submitted amount of the effect is frequently adjusted in the direction of reduction. At the same time one must keep in mind that until the cause is eliminated, and it is the

monopolistic position and dictatorship of the manufacturers in the process of price-setting, as long as the futile struggle against "legal violators" in this sphere of economic management continues, it will not be unusual to see cases of completely unjustified price hikes determined according to the expenditure method: "the DL-4M machine of the Leningrad Vulkan Plant is 7.5 times more expensive than the previous Interlok. It consumes more electricity and its productivity is 25 percent lower. Moreover, the quality cannot withstand any criticism. It is always necessary to call plant representatives in order to eliminate defects." (Footnote 4)

It seems to us that there can be only one solution here—complete reorientation of price setting from the manufacturers to the consumers of the products. It is the consumer who should determine the projected limit price as the maximum permissible one under the conditions of effective application of the product, that is, on the basis of its social consumer value (usefulness).

The price, constructed taking into account the social consumer value of the product, should subsequently be "imposed" on complete national economic expenditures for production, including, in addition to current expenditures (production cost), also the sum of deductions for proportional expenditures of all production resources according to the corresponding normative coefficients of their effectiveness (net income). If the price exceeds the complete national economic expenditures there is an additional above-normative effect because of the special progressiveness of this product; if they coincide, both the society and the enterprise receive a normative effect and, finally, if they are lower, the product is ineffective or not effective enough according to the normatives that have been adopted.

The price, constructed taking into account the social consumer value, should be determined by the consumer who has "his own" finances, that is, funds he can spend for the acquisition of the means of production. In this case he can deal directly on the market of means of production if there is one or he can negotiate prices during the process of concluding economic agreements with the manufacturers of the product. But this, of course, is only for those kinds of products which do not have firmly established state prices and are in the category of contractual. It is these prices that should be drawn up taking into account complete national economic expenditures of managers, determined as the production cost with the added net income, but obtained in the form of the sum of proportional expenditures of production resources (live labor and capital) according to the corresponding normatives of the effectiveness of their utilization.

To be sure, the following question arises: If one consumer has a "full purse," he can offer as high a price as he wishes to, while another consumer with considerably less money will be deprived of the possibility of acquiring this kind of product which is equally necessary to him.

Of course if one allows the market for means of production to operate according to its own laws and establishes here prices only according to the agreement of the parties, one can have the most unexpected and, unfortunately, not always favorable consequences. Therefore it is extremely important to have scientific methodology for planning price setting, methods of establishing prices approved by the USSR State Committee for Prices and other agencies, and strict control by them over the correct application of these methods. This is obviously not the place to consider the question of how many and what these methods should be. Before creating them it is necessary to concretize the general methodological principles for determining prices for means of production and objects of consumption which were discussed above.

The establishment of prices taking into account the useful effect of the product makes it possible also to remove the problem of profitability in the form in which it now exists since the degree to which such a price exceeds the level of production expenditures automatically characterizes the amount of profitability of this product. Thus its profitability becomes derived from the amount of national economic effectiveness.

All this makes it possible to take a new approach to the problem of the criterion for evaluating the activity of enterprises. Now there are essentially two of these criteria: the value volume of products sold and the degree of fulfillment of economic agreements. The latter is clearly of an administrative nature; its introduction was brought about not by any internal factors in the activity of socialist enterprises but by shortcomings in planning and the weak economic effectiveness of sanctions for failure to fulfill economic agreements which in principle is overcome when real cost-accounting relations are organized both along the horizontal and along the vertical.

If there is strict material responsibility, with payments from profit for erroneous decisions on the part of planning agencies (in principle, they too should have their own supplies of financial resources formed from the corresponding deductions from enterprises under their jurisdiction) or violations of economic agreements by the enterprises themselves, the need for this latter criterion will no longer exist.

Then there will be only one criterion—profit, which is considered to be the difference between correct prices (established taking into account the social consumer value of the product) and correct expenditures (calculated as the sum of production cost and deductions for proportional expenditures of production resources according to the corresponding normative coefficients for their effectiveness).

This will also be a measurement of the enterprise's contribution to the overall national economic result of production. We shall not touch upon the problem of

distribution of profit here although we understand its importance for arranging effective relations between the enterprise and society and also within the enterprise itself.

Taking what has been said into account one can draw the conclusion that the basic work for establishing prices for the list of many millions of products and services should be done according to agreements between manufacturing enterprises and consumers with the consumers playing the major role, which requires a change in the policy for the formation and utilization by enterprises of internal financial resources, including funds for expanded reproduction.

At the present time the system of price-setting agencies is functioning to a certain degree in isolation from the system of planning, material and technical supply, and trade; it is based essentially on the delimitation of the "spheres of influence" of central, branch and local price-setting agencies according to the indicator of the significance of the product. In order to combine the process of planning and material and technical supply with the process of price setting and at the same time provide the necessary combination of centralization and decentralization in the establishment of prices, one should rearrange the price-setting system on the basis of the following points:

- prices for key products that are structure-forming for public production, according to a limited list (approximately 1,500-2,000 items) are established by the USSR Gosplan as part of the five-year plan on the basis of planning-balance calculations with the coordination of the USSR State Committee for Prices;
- prices for a larger list of the most important products (20,000-30,000 items) are established by agencies responsible for the development of material balances for these products—branch ministries or the USSR Gosplan with the coordination of the USSR State Committee for Prices and taking into account the dynamics of prices for products that are in the list of the USSR Gosplan;
- prices for the remaining specific kinds of items are established in economic agreements (contractual prices) by suppliers and consumers in keeping with the rules established by the USSR State Committee for Prices and taking into account the dynamics of centrally planned prices for the most important representative product; work for substantiating the price level should be carried out in the USSR Gosplan (wholesale prices), the USSR Gosagroprom (procurement prices), and the USSR Ministry of Trade (retail prices);
- the functions of the USSR State Committee for Prices could be expediently determined:

a) in preparing for and publishing methodological materials instructions that regulate the process of price setting at all levels and for all kinds of prices and tariffs;

b) in verifying the correctness of the establishment and application of prices.

The role of the price as an instrument of planned influence on increasing the effectiveness of public production under the condition of the accelerating rates of scientific and technical progress should be significantly increased.

Footnotes

1. Materials of the 27th CPSU Congress, Moscow, Gospolitizdat, 1986, p 35.
2. Marx, K., and Engels, F., "Soch." [Works], Vol 25, part II, pp 185- 186.
3. Ibid., Vol 19, p 387.
4. PRAVDA, 10 April 1986.

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Professional Knowledge Seen as Commodity

18200222i Novosibirsk *EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO)* in Russian No 7, Jul 87
pp 114-119

[Article by G. P. Zykin, SVTservis Enterprise for Computer Service (Alma-Ata): "Professional Knowledge Is a Product of Production"]

[Text] "Here is a paradox: any director would probably be soundly reprimanded for this kind of attitude toward machine tools, for example, or any other technical equipment. But rarely has a person received a reprimand for personnel losses. And no wonder: although training each student costs the state from 5,000 to 20,000 rubles, for the enterprise they are 'free of charge,' unlike machine tools they cost nothing."

S. Kozyrev, "Drama At...Work,"
Komsomolskaya Pravda, 7 January 1986

The Interests of the Sides

The existing situation with respect to the training and utilization of specialists is formed and reproduced as a result of the interaction of at least three basic participants in this process: training institutions, the people who are trained, and the enterprises. Material incentives in their interrelations are still weak. The amount of the goods received by the training institution depends on many things but not on the performance of its basic function—providing specific branches with specialists in the necessary quantity, quality and assortment. All graduates receive identical documents certifying their completion of the VUZ, which do not give information about

the level of their qualifications. The nature of the VUZ and the quality of the knowledge that has been obtained play an insignificant role in their production activity. And at enterprises there is no appreciable dependency between the quality of personnel and the final results of their activity.

Efficient mutual monitoring mechanisms are still dreams. The enterprise, as a rule, cannot influence the content of the training process and is forced to accept the young specialists who are sent to it. There are no legal forms that make it possible to refuse to hire a graduate who does not meet the requirements. Therefore those managers who are trying to attract the qualified personnel are forced to scheme and set out fabricated pretexts.... Frequently a training institution checks on the utilization of its graduates in production and, if necessary, intervenes and demands that the situation be rectified. But it is much more frequently the case that once a diploma has been awarded to a graduate he is forgotten. And any teacher is his own supervisor. The "personal seal" is entrusted to all and not just to the best as it is at enterprises. There are no rights for mutual monitoring among the students or later among the specialists.

Expenditures of "Humanism" and the Production Approach

When the modern system of education was formed it was faced with the task of opening up the way to knowledge for the broad masses of workers. Today this has been done successfully. One of the basic, although not fully recognized, consequences of the general humanistic direction of the Soviet system of education was, in our opinion, the fact that man was considered to be the object in it. The goal was the right to obtain an education and not the education itself, professional qualifications, or the sum of knowledge. Now this goal has been reached. It seems to us that the production aspect of training is coming to the fore. In order to arrange the training of personnel as a production process and include in it economic factors and stimuli, it is necessary to define this product clearly.

In recent years the concept "information object," which appeared in programming, has come to be widely used. We are gradually recognizing that not only a computer program but also instructions, a monograph, a poem or a symphony in the final analysis is an information object. The most important peculiarity of this object is its relative independence of its physical bearer. A program can be written on paper, punch tape, or magnetic disk. In all cases it is still a program. Analogous to a poem, it can be printed in mass quantities or carved into rock—its merits and shortcomings do not change because of this. We are increasingly coming to understand that the quality of information is provided by independent processes that have little to do with the manufacture of the bearer or the information copied on it.

It is suggested that we recognize that the sum of professional knowledge intended for application in a particular production area is also an information object. This interpretation requires that we consider this object separately from its bearer, that is, the specialist. Of course, such a statement of the problem seems antihuman at first glance since man and his right to an education no longer figure into it. But the one does not contradict the other. While recognizing the right of an individual to an education (or in a new formulation—to the “acquisition” of a professional information object) according to his selection, we have the right to demand an economical attitude toward the production and utilization of these objects.

In order to simplify the terminology, henceforth, as usual, we shall speak about professional knowledge and professions understanding this to mean the information object formed as a result of a certain production (training) process and intended for utilization in production.

For any product of social labor there are accounting for expenditures on its creation, the price, the shift of value to the product produced by utilizing it, repair, writeups.... When interpreting professional knowledge as a product of production we are forced to recognize that these and many other economic concepts must extend to it. It is necessary to have clear-cut indicators of the quality of training and the sum of knowledge; the producer must produce a product that meets established requirements; this “product” (the specialist, that is, the man plus the sum of acquired knowledge) must have a price; it is necessary to account for production costs, the procedure for distributing resources, and so forth. The consumer must pay for this product and make “amortization deductions” for its restoration and renewal and transfer some of its value to the product it creates. Having recognized the professional knowledge of workers as an enterprise as a resource, we are forced to think about resource-saving technologies for them.

Here again one might feel the inhumanity of the proposed interpretation. But, in our opinion, it is more human than the existing one. By regarding a specialist as a bearer of a sum of knowledge and a resource, we automatically create a clear-cut economic basis of the activity of services and agencies for public health, increasing qualifications, personal staffing and so forth. Moreover, by recognizing the dividing line between our general human rights and our professional value, the worker will have the right and the incentive to be concerned both about the actual growth of this value and about its correct reflection in “accompanying” and report documents.

The Formation and Evaluation of Professional Knowledge

The training institution, the trained person, or the enterprise—who is the most prepared to recognize the professional knowledge, abilities and skill as the same kind of

resource as raw material, equipment, and energy? Production, of course. The proposed interpretation will require, perhaps, only a psychological rearrangement (and system planning) and legal recognition of knowledge as a resource.

It is quite a different thing with training institutions. The new approach presupposes an evaluation of the quality of knowledge as a product of public production. It is clear that the existing self-evaluation in these VUZes will not solve the problem. It is necessary to have a unified system for evaluating the qualitative level, independent of specific enterprises, institutes and departments, something like the state acceptance of products.

Obviously it is possible to do without establishing a regular agency if one expands the functions and rights of the High Certification Commission (VAK), making it responsible for evaluating not only scientific, but all professional personnel. To do this it would be necessary to create local VAK agencies. The main thing is to separate out the acquisition of knowledge and evaluate it. Final exams for moving from one course to another is a matter for the VUZ itself, but when a diploma is awarded, in our opinion, the graduate should apply to the corresponding (regional or according to profile) VAK agency where they would have to take professional examinations. And it would be desirable to allow anyone who wishes to take the exam, regardless of the period or the form (regular, evening, correspondence, or external studies) in which they studied. In order to put a stop to attempts to influence the examiners and retain freedom of access to the examinations, it would perhaps be expedient to charge for the examinations. This would contribute to the self-support of the certification agencies.

Who would pay for the examinations—the enterprise, the training institution, or the graduate? Here it seems expedient to have a differentiated approach. The higher educational institutions would pay for the first attempt to certify their graduates who had completed their full course. Of course, this would hardly be possible without introducing cost accounting in the higher technical schools. The enterprises could pay for the certification of their workers who were retrained through their own forces under production conditions. If they failed at the first (preferential) attempt or if they have not had systematic training, these examinations could be taken by any citizen at their own request and at their own expense. But in all cases the procedure for certification should be paid for and not its final result.

In order for the system of accounting for professional preparedness of personal and their certification to function normally, it is necessary for all professions to establish categories. The evaluation of the qualification should be sufficiently specific and comparable. For example, it should not be simply “successfully passed examination on methods of programming minicomputers,” but “in some specialization (say, programming

minicomputers) the third category has been conferred." In our opinion, it would be expedient to make the corresponding entry in the labor book. With this approach it becomes not a "notification of job changes," but a detailed certificate of professional training. Naturally, it will be necessary to revise the policy for keeping labor books: There is perhaps no need to store them in the personnel department, but they could be submitted to certification agencies for making the qualifications entries. Then the labor book could replace the diploma.

It is impossible to do without a general classificational evaluation of work places. For each enterprise, in keeping with its "rank," it would be good to establish which specialization and which category are required by a specific work place for a position. Of course, this evaluation should be standard. It would be expedient to envision a minimum level of qualifications and additional payments (progressive) for higher levels as well as the level where the additional payments would begin to increase. This system would reduce the unjustified appointment of specialists with inadequate qualifications to key workplaces.

The proposed interpretation of professional knowledge gives the specialist the moral right and incentive to be concerned about his own worth. This concern, apparently, would be manifested in two areas: when acquiring and when applying knowledge. Separating certification from the training process will create favorable possibilities for a man to make a free selection: how precisely to acquire knowledge (in lectures, in the process of independent study, or combining the two). That is, the lecture becomes one of the alternatives. Moreover, training in a VUZ becomes a privilege and not the only form of obtaining a higher education. The difference between the student who is an auditor and the external student is erased and amounts to the difference between the expenditures of the VUZ on the training of specialists. One can imagine a system whereby a person who has received education as an external student has the right to receive reimbursement for a certain proportion of the established "value of the occupation." With this approach there is a sharp change in the role of the evening and correspondence forms of training as well as the training schedule.

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Manual Labor in Production To Decrease

18200222j Novosibirsk *EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO)* in Russian No 7, Jul 87 pp 119-120

[Article by M. D. Peskin, premier engineer of the Laboratory for Scientific Organization of Labor (Vitebsk): "Reducing Manual Work"]

[Text] In our branch passports are being drawn up for manual work. The enterprise has received assignments "from above" to reduce their proportion. They already have a certain amount of experience in doing this work. When we began it it seemed that everything was simple. There is an assignment to reduce the level of manual labor and we calculated the number of workers whose labor should be mechanized. In conjunction with the shop we revealed the reserves and earmarked technical measures to provide for this replacement.

But other measures for reducing labor-intensiveness and assimilating new items are also being conducted at the shop. And they, while they significantly influence the improvement of economic indicators, do not always improve the indicator of the level of manual labor. The practice of working to actually reduce manual labor shows that this matter is far from simple and the achievement of the given percentage of manual labor far from always means the achievement of a high level of production effectiveness. It is possible to reduce the volume of manual work without decreasing its proportion. This will happen, for example, if at the same time the volume of mechanized work decreases and also when measures are being taken to improve the utilization of existing equipment.

There is a negative effect on the level of manual labor by such progressive measures as the introduction of multiple machine tool servicing of equipment, expansion of the service zones, and the replacement of existing equipment with more progressive and productive equipment since then the number of workers engaged in mechanized labor decreases. A general reduction of the number of personnel also makes this indicator worse. Moreover, under the conditions of our production the assimilation of principally new items begins with a minimum selection of technological equipment and a prevalence of manual labor. Thus at first each new item "raises" the level of manual labor. One must think that the goal of introducing the indicator of the level of manual work was to achieve a higher level of labor productivity, reduced labor-intensiveness and improve working conditions, and not mechanization at any price.

But, as becomes clear in the process of working to draw up passports for manual work, the indicator of their level has little to do with this while the indicators of labor-intensiveness and the increase in labor productivity encompass questions of reducing the labor-intensiveness of manual work as well. This indicator should be the basic one. I can say nothing against accounting as such, including accounting for manual labor. The Central Statistical Administration, as they say, must "know everything." But we have become accustomed to doing it this way: from the established indicator we compare the various enterprises and even various branches. And "competition" begins under pressure from above. Taking advantage of a certain diffusion of formulations and

trying to improve the picture, many enterprises are trying to beef up the figures, in other words, to make things look good. And there are cases like this.

But who needs this?

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Lessons From Chernobyl Discussed

18200222k Novosibirsk *EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO)* in Russian No 7, Jul 87 pp 121-131

[Article by V. Gubarev: "Echoes of Chernobyl"]

[Text] In the article printed below a well-known Soviet commentator Vladimir Gubarev has generalized his impressions from a trip to the Chernobyl Atomic Energy Station. Gubarev was the first of the journalists of the central newspapers to arrive in Chernobyl after the disaster that took place there. This was the origin of his essays and correspondence published in *Pravda*.

Vladimir Gubarev is the author of the play "Sarcophagus," which not only artistically generalized the events of the Chernobyl tragedy but also critically raised the problem of utilizing atomic energy. The play is already being performed on the stages of a number of cities of our country and has also been staged by the Royal Shakespeare Theater in London and drama groups of Sweden, Japan, the Netherlands, the FRG, Hungary and Poland.

The walls of a sarcophagus have grown up around Energy Block 4 at the Chernobyl AES. Simply speaking, it is a grave in which the disastrous reactor is buried. It is an unusual and extraordinary structure. The first in the history of civilization. Whether we like it or not, the sarcophagus will remind our ancestors of current events.

But what does this monster of concrete and steel symbolize?

At a special meeting of the Politburo of the CPSU Central Committee in the summer of 1986 the entire range of problems associated with the disaster at the Chernobyl AES was analyzed. They pertained to various aspects of our life—from ways of developing atomic energy to preserving peace on the planet and destroying nuclear arms. The Politburo expressed its confidence that every Soviet person would draw the proper conclusions from the lessons of the disaster at the Chernobyl AES. In the decree that was adopted they analyzed the reasons for the disaster, punished the guilty parties, and earmarked concrete measures for safe development of atomic energy engineering. The scale of the document was significant. In particular it notes: "The disaster at the Chernobyl atomic energy station is a serious lesson

from which the ministries and departments, scientific, design and planning organizations, and economic, soviet, and party agencies should draw exhaustive conclusions."

For many months my life and work were linked to Chernobyl. In my memory are my impressions of the first days after the disaster. The time came for analysis and contemplation, and thousands of letters from PRAVDA readers caused me to see what had happened in a different way: along with those evacuated to experience the bitterness of the loss of their home, along with the soldiers, to do that not completely comprehensible work that is called by the foreign word "deactivation," to observe how the shifts go on duty to watch over the energy blocks of the wounded station, to take joy in each new building constructed for families who had been deprived of their life blood.... And it is not easy to answer the questions which is always asked at meetings among people: "What do you remember most of all about Chernobyl?" Because one remembers everything.

Now, after a certain amount of time, the answer is simple: when eliminating the emergency at the Chernobyl AES one could see clearly and in all ways the greatness of the spirit of the people, their heroism and courage, their compassion and sense of a common disaster. Chernobyl is an open wound not only on the shore of the Pripyat but also in the soul of each person. Regardless of where he may live and work—in the Far North or in the hot South, in Brest or in Vladivostok—the attitude toward what took place in Chernobyl opens up the heart of everyone.

"The world is large and we live among good, responsive people, in a country where sympathy with man is an indispensable and all-embracing moral law," writes the secretary of the party organization of one of the factories of the Ore-Enriching Combine imeni Komsomol Ukraina, P. Krasnyuk, on instructions from the collective. "No, it was not panic that the disaster at the Chernobyl AES caused in our people, as some people abroad would like to think. Even great, obviously terrible evil and cruelty that has befallen man on his path are incapable of counteracting the immense force of good that lies in our society and in the spirit of our people. We must believe in this and we must live with conviction."

"We are with you, Chernobyl people!"—for the majority of Soviet people these words became not only a slogan, but also a deed. And they were manifested in various ways: in thousands of requests to be sent to work in the danger zone, in monetary transfers to Account No 904, in student construction detachments that had worked in Kiev and Gomol oblasts, in work shifts donated to the Chernobyl fund and, finally, in the concern for children from the regions that suffered and in words of sympathy.

In some people the disaster caused a negative attitude toward atomic stations in general. "We have had certain productions operating not for years, but for centuries,"

writes N. Sinelnikova from Voroshilovgrad, "and disasters happen at them too. There will probably be more of them at atomic electric stations as well. If not here, then in other countries.... You cannot breathe on the streets because of the automobiles, and here is also the atom.... This is how certain of us think and this is our attitude toward atomic energy."

The easiest thing would be to ignore this opinion, but the lessons of the disaster in Chernobyl requires something else: painstaking and thoughtful explanatory work and analysis of the conclusions of such people. Especially when speaking about the location of new AES's. For example, it is difficult to justify and explain the appearance of these stations in the health resort zones next to existing TETs's and GES's or in agricultural regions that are renowned for their soil—taking this away for the construction of any industrial facilities, including atomic stations, is most frequently economically unjustified. Possibly, in the current stage of the development of science and technology there is some point in returning to the idea of Academician N. Dollezhal, who at the end of the 1960's suggested creating on "abandoned land"—in deserts and sparsely populated regions—large energy industry complexes which would include atomic stations and energy-intensive productions....

Today we are obliged to consider much of atomic energy engineering through the prism of Chernobyl. And not only this....

Major Leonid Telyatnikov went from Moscow to Kiev. The clinic and sanatorium were in his past. He was one of the first to fight the fire at Energy Block 4. Many of his friends are no longer with us, but they were the ones who prevented a "chain reaction" of the disaster. When the fire threatened to move across the roof of the machine room to the remaining three blocks of the AES the firemen stood in its way.

The feats of the firemen have been discussed in detail in newspapers and poems have been dedicated to them. Their names have been written forever on the lists of units and subdivisions. The heroes will always remain with us. But now, when saying farewell to Telyatnikov, a miracle who survived (and this miracle is the victory of the physicians of the Sixth Clinic), we are speaking about something else.

"The main thing in what happened," said L. Telyatnikov, "is the lessons...so that nothing like this happens again."

The lessons from the disaster were discussed in the AES party committee and they were considered by workers of the station, designers, academicians Ye. Velikhov and V. Legasov, physicians and specialists with whom I had occasion to speak both at the station and in the stack, as well as the control points and in party and state institutions. Helicopters still hovered over the damaged reactor, throwing lead and sand on it, the full extent of the

damage was not yet known, and everyone I met at that time had to speak about the lessons of Chernobyl. Too much was revealed during the first days of the disaster. Much of that which had seemed obvious upon being tested seriously was in vain: it turns out that it exists only on paper and in success reports....

I recall that a kolkhoz chairman broke the glass in a building and ordered glass slides to be made from it for analyzing blood because the medics did not have any....

I remember how they distributed dosimeters but there were no batteries for them in the warehouse....

I recall how a general went to the site of Energy Block 4 in a black Volga bragging about his courage....

I recall a soldier sitting fishing on the bank of the Pripyat; it seems nobody had explained to him how dangerous this was....

I recall the confusion and helplessness of certain managers who were obliged not only to know everything about what had happened, but also to immediately take the necessary measures and not wait for instructions for Moscow....

Much remains in my memory.

There are the wide open gates of the peasant yards ready to receive the sufferers...the exhausted, unshaven face of an academician, the tortured eyes of a minister, and a physicist who had stayed up all night....

Also stored in my memory is a cat with its back arched wandering through the road. And the needle of an instrument broken from radiation.... And the lacerated layer of land which would not be able to feed man for a long time....

Much remains in my memory.

The flame on the roof of the machine room told not only of the heroism of N. Vashuk and V. Ignatenko, V. Kivek and V. Pravik, N. Titenko, V. Tishury and other firemen. It cast light on the mistakes and the criminal negligence of those who designed and constructed it.

A long time ago, more than 10 years ago, the journalist G. Bocharov went to Bukhara. There was a fire there—in 40 minutes a factory had completely burned up. The reason: to insulate the roof they had used plastic foam—flammable material. After the fire a commission was created and the procurator's office went to work. The guilty parties were sentenced.... And then there was a fire in the Baykal area. The reason was the same kind of roof. And again the procurator punished the guilty party. And the conclusions? The roof of the machine room of the Chernobyl AES was of the same material as that in the factory in Bukhara and the plant in the Baykal area.

For some reason it turned out that the warning of the fires was considered to be the business of the fireguard alone. In 1986 there were more than 10 fires in the country causing damage of more than 1 million rubles (the largest of them "cost" 32 million at once) and the others, "the lesser ones," are difficult to calculate.... In the general stream of scientific and technical progress fire safety has turned into a stepdaughter. When creating technological processes, machines and equipment, and automated systems it is frequently forgotten. And at the same time there are simply not enough technical means for fire protection and the ministry of instrument making automation equipment and control systems and its association, Soyuzspetsavtomashina, are not satisfying the needs for them in the national economy.

Major general of the interior service and chief of the Main Administration for Fire Protection of the USSR Ministry of Internal Affairs A. Mikheyev speak bitterly about this: his subordinates have to pay a high price for inefficiency and neglect of safety. The firemen demonstrate miracles of heroism but most frequently they die because of the criminal negligence of others. And this is what happened at the Chernobyl AES.

The firemen who were on the roof the machine room are well aware of the danger caused by radiation. But they remained at their post until the end. This is their duty and they carried it out. But why do they not have protective clothing, breathing devices, and reliable means of communication? Because the fire units and subdivisions were not provided with enough of them and many of those they had did not meet modern requirements and frequently malfunctioned.

"Irresponsibility, negligence, and lack of discipline led to serious consequences. As a result of the disaster 28 people died and many people suffered damage to their health," it says in the decree of the Politburo of the CPSU Central Committee. Some of the people guilty of what happened have been punished and others are in court. But we have our common court—the court of memory. And while giving its due to the heroism of some we must recall that there was criminal negligence and irresponsibility on the part of others. Only then will we draw the correct conclusions from what has happened.

Vladimir Lyskin and Nikolay Oleshchuk work as foremen in the electrical shop of the Chernobyl AES. They were not on duty during the night when the emergency occurred but they immediately came to the station when they found out about it. And along with their comrades they did everything necessary to localize the damage. They managed to "wash off," to escape the "glow": although it was significant, the dose of radiation was not an immediate danger. After dosimetric monitoring their comrades were immediately sent to the hospital. But neither Lyskin nor Oleshchuk nor other workers of the station who lived through this terrible night ran away—they remained at their post. And after 2 weeks, as soon as the medical workers permitted it, they returned to the

station in order to stand watch on the first, second and third energy blocks. We met with them in the Lesnaya Polyana camp where the base for AES workers was located immediately after the disaster. The conversation was not only about the events in Energy Block 4 but primarily about the causes of the disaster and how it could have happened.

"In recent years it has become difficult to work," said Oleshchuk. "The fact is that the ministry of power and electrification has gradually erased the distinctions between thermal, hydraulic and atomic power stations. Instructions have been published and they have been the same for conventional and atomic electric power stations. Even the staff distribution chart has sometimes been reduced in a purely mechanical way.... For example, the preventive inspection of energy equipment, and ours is complicated, requires about 20,000 man-hours, and we do not have enough personnel—they have reduced our numbers. Even working 10-12 hours a day, including Saturdays, we could not keep up. And now we have to send workers for agricultural work.... In general, someone has begun to forget that AES's should occupy a special position!"

"And the orders for equipment?" Lyskin became bitter. "You have to wait several months to obtain a simple switch. You draw up an order for the most necessary, urgent thing, and the paper begins its long journey. By the time it goes from the shop to the ministry and then to the supply enterprises it takes 3-4 months—this is at best. And previously this problem was solved in a moment.... And another tendency can be clearly seen: during the past 10 years (and I have been working in atomic energy for a long time) the quality of equipment has deteriorated. Moreover, our station has begun to receive not new equipment, but repaired equipment. And now we have to get it through our own forces.

Unfortunately, this was not the first time I had heard this. And not only in Chernobyl.

I had occasion to visit the Beloyarskaya AES where they were preparing to start up a reactor with fast neutrons. A principally new direction was being originated in atomic energy engineering and, it would seem, one should have a special attitude toward such installations. Nonetheless the physicists were complaining that they themselves not only had to inspect all the equipment coming to the AES, but also weld and solder it from the beginning and apply protective coating to the parts since these things were not done well at the manufacturing plants. There were many complaints against the builders as well. Alas, not all of them provide for the highest quality of work, which should be an indispensable law at an AES.

Experience in atomic energy engineering is achieved at a high price these days. But judging from everything, some people think that since they are far from Chernobyl, the events at Energy Block 4 do not pertain to them. A deception! They pertain to each of us because they

happened mainly because of a lack of the proper technological discipline. And increased vigilance is mandatory not only in atomic energy engineering, but also in transportation and in mining. In our age of scientific and technical progress safety can be guaranteed only by high quality of labor, discipline, composure and professionalism.

The CPSU Central Committee Politburo told us directly and frankly that "the accident took place because of a number of gross violations of the rules of operating reactor installations by workers of this electric power station." The government has taken measures which will help to rectify the situation. The Ministry of Atomic Energy has been created and the network of trainers for training operators of AES's will be expanded. Actually, an abnormal situation has developed—pilots, for example, have trainers, but AES operators do not. And yet neither one of them has the right to even one mistake—it is too costly.... A complex of measures has been envisioned which will provide for safety of reactors.

But the problem is broader and goes beyond the framework of the national economy.

It is still impossible to believe that the person on duty on the shift turned off an emergency system for cooling the fourth reactor! And in the evening the dispatcher of Kievenergo "requested" not to send the reactor for repair for a certain amount of time since "there was not enough energy"... And the reactor continued to operate. Even to a slightly technically educated person such an accumulation of absurdity and gross mistakes seems improbable. But nonetheless it happened, which also led to the explosion in the reactor. A confusion of obligations? Undoubtedly. But their appearance was brought about by deeper reasons. The accident at Chernobyl illuminated these sore points. Yes, we discussed them, but then we forgot that the problems must be solved not by someone else, but by ourselves.

Can we really not be disturbed by the fact that the prestige of the profession of engineer and designer is declining, that a diploma for a higher education still does not mean that the national economy is receiving a highly qualified specialist? And how many times on the pages of newspapers have they blamed outstanding scientists and designers for the fact that the requirements in the higher school and production for young personnel are decreasing and that the increase in talented engineers and designers is being impeded?

National artists are widely known, but where are the national designers? In recent years there have been few books or movies discussing the creativity of today's scientists and engineers, designers and technologists. And do the creators of new technical equipment not deserve the same popularity as Alla Pugacheva or Konstantin Raykin?

Incidentally, one cannot but feel gratitude for Alla Pugacheva! Shocked by the disaster in Chernobyl, she immediately organized a concert to raise money to help the victims. But among the well-known movie actors for some reason there were none who desired to accept the invitation of the Chernobyl residents. For a long time they were unable to gather a brigade of "movie stars" for the trip. Incidentally, there is a good justification—the summer is the height of the vacation season and many groups are working on the Black Sea coast. To be sure, some telephoned the editorial office and asked if they could really go there? Was it not dangerous?...

They could, it was not dangerous. But nonetheless this is the kind of letter than came from workers of Gomelselmash: "Of course, you might not respond to this letter, but understand us correctly. The fact is that the artists of the Moscow team refuse to work in the Gomol area. Since the time when the catastrophe took place in Chernobyl they will not come here. Tell them not to be afraid—we are living here and we are even working in the zone. We enjoy the artists of the Belorussian Philharmonic, the Pesnyary Ensemble, but we are ashamed of the artists from the capital. How many times do we have to send them tickets?! And what is the Ministry of Culture doing?"

Another problem was reflected in the mirror of the accident. It is difficult to determine its dimensions and it is impossible to measure it either in rentgens or in kilowatts, it has different parameters. But it is real, palpable and the damage from it can be felt even in the distant future if we do not begin to fight against it today. This problem can be defined by the word "ignorance."

The stack of letters lying on my desk and the notes from the hall received in the auditorium are so well known that people who are so well known and respected that it is uncomfortable to name them show that: very many people do not know the elementary things that a sixth grader should know. An engineer from Kharkov cannot define the difference between a hydrogen explosion and the explosion of a hydrogen bomb and his collective from Kiev has no idea what a natural radiation background is and a young woman from Krasnodar is convinced that "children from the Pripyat will infect others around them with radiation," educators from Poltava demand that "this year people do not sell fish from the Dnepr," and so forth and so on. One wants to ask: Dear comrades, what did you learn in school? Finally, in the VUZ?...

Through conversations with residents of Pripyat it became clear that they have a very confused idea of what nuclear energy, radiobiology and ionized rays are, not to mention the fact that they have no idea about isotopes. It would seem that they, who are residents of the atomic city, should know this! And those managers who on the scale of the oblast and republic are responsible for

atomic energy engineering? In the conversation it suddenly became clear that the managers were there to manage, and they looked in books on physics and radiation safety (popular ones, of course) only after the accident at the station.

We frequently repeat the words "scientific and technical revolution," "acceleration of scientific and technical progress"—such is our age. All we have to do is look 2 or 3 decades into the past and we immediately understand how much the world around us has changed. The most complicated technical systems have come into it, it is filled with physics and electronics, machines and mechanisms, sometimes so complicated that it is even difficult to understand how and why they operate. But our age of space travel, the atom, electronics, and information science requires knowledge. And constant training—you cannot live with the baggage of the past.

Unfortunately, certain lessons from the accident have still not been learned, although this should have been done in the first days of May. We are speaking about the "Campaign Against Illiteracy Concerning Radiobiology." Of course, when they speak on Kiev television and explain that "for preventive purposes it is necessary to take a shower and wipe off the furniture with a wet rag" this is useful, although such "prevention" never hurts anybody. But they never really managed to organize educational work, that is, tell the population about the radiation situations, the methods of deactivation, the changes in the isotropic composition of the soil, the utilization of vegetables and gifts of the forest, and real or illusory dangers. Red Cross advocates have not been able to arrange this work. One is impressed by the figures from the reports of the civil defense staff: so many millions of people attended classes and gave reports, went through practical training, and so forth. But here the accident occurred—and the value of these figures became clear. The "knowledge" disappeared somewhere and you cannot find the "advocates."

The accident caught many unawares. And only after weeks did the flywheel begin to turn, and it is already difficult to slow it down. And this, in turn, caused new complications: it turned out that more materials than were needed were shipped to the AES site, transshipment bases were constructed in places where they were not needed, and they started work about whose expediency there were grave doubts.... No, there was no experience. Yes, this was the first time an accident had happened on such a scale. Yes, much was unexpected. All this is true, and it is necessary to take into account the extraordinary difficulty of the situation. But was it possible to foresee something of this kind? And even being confident that such an accident was "practically impossible," nonetheless shouldn't there not be a plan of action? And again this is nothing other than ignorance, because it is only in the grip of a lack of knowledge that one can assert: "This cannot be because it can never be!"

New generations have already grown up since the startup of the first atomic electric station and the flight of Yuriy Gagarin. They have entered life regarding atomic energy as something ordinary and natural. And yet this is the newest area of science and technology and in essence it is taking its first steps. But we do not instill this sense of innovation in the young people.... I recall how many popular scientific books came out during the 1950's. Discussions about "physicists" and "lyricists" attracted the attention of almost all the youth in the country.... Then the "lyricists" won out and the "physicists" continued their work quietly—creating technologies. But "lyric" continues to reign about the youth, evidence of which are at the competitions in technical VUZes: it is no longer a matter of selecting the best of the applicants, but in general getting them to take the course.... Only 5-6 years will pass before these same school graduates who today are barely willing to cross the threshold of a VUZ and who find it difficult to study there because they do not have knowledge, but nobody has abolished the "plan" for graduation—these people will be sitting at the panels of atomic reactors and electronic systems, energy giants and automated lines....

Familiarizing youth with technical equipment is one of the most crucial tasks of our day. We cannot make this compulsory; only by exciting the fantasy, imagination, and curiosity can this be done by the most extensive educational work. We need popular books, the same ones of which there are so few today even in the long-range plans of the publishing houses—from "Detskayaliteratura" to Politizdat. And even the word "education" must be rejuvenated. The Congress of the Union of Writers just took place. There were various papers and speeches. I attentively followed each of them and waited to hear from the podium a word about the fact that literature must engage in the education of the people. I never heard it. And if in the current "table of ranks" science fiction is considered "second rate" literature, it is even unpleasant to speak of popularization. And yet UNESCO statistics show that in the world of readers there is a prevalence of popular science literature and science fiction, and then comes documentary literature....

The lessons of Chernobyl pertain to various aspects of our life and my notes pertain only to some of them. As we enter tomorrow we must take these lessons into account. Chernobyl makes it incumbent upon each of us to achieve discipline and highly skilled labor. And one more thing absolutely must be mentioned: how dangerous the atom can be when it is out of control. There was a tragedy—a nuclear wound appeared at one point of the earth and how difficult it is to heal it! And if the entire planet were that way? Chernobyl showed how catastrophic nuclear war can be, it confirmed that the only path to the safety of mankind is disarmament, and first and foremost—nuclear disarmament....

...The walls of a sarcophagus at the industrial site of the station of Energy Block 4. It should become a monument to the heroism and self-sacrifice of the people who at the

price of their life and health put out the nuclear fire. The sarcophagus must become a symbol of our victory over the atomic accident, but it can also turn into a symbol of weakness, deception, and the mistakes of our time if today, right now, each of us and all of us together do not take into account the lessons of the accident in Chernobyl and do not draw all the proper conclusions from it.

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Writer Views Economic Life

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[Story by Georgiy Kulishkin: "Closer to the Ruble"; first two paragraphs EKO introduction]

[Text] G. S. Kulishkin is a young writer; he is 36. "Closer to the Ruble" is his first story. The writer's realism originated from a knowledge of life: he lost his parents early in life and immediately after school was forced to be concerned about money, and he studied in the VUZ "without leave from production," working in a shoe shop. All the problems about which the writer writes so keenly, passionately, and uncompromisingly were, in his own words, his own problems. The author shows the painful phenomena that occurred and accumulated in our society during the period of stagnation, which afflicted our economy, morality, and human relations with disease. Ordinary production problems acquire tragic resonance in the story. But it is also optimistic: the author, along with one of the main heroes in the story, Dmitriy, looks for a way out of the problems that have burdened him like a tight, heavy yoke....

The editors were not unanimous about whether or not to print this story in EKO. There were doubts: should a scientific magazine print an artistic work? And is this subject "ours"?—after all, the magazine deals with the economics and organization of management in large-scale industrial production, and the action of the story takes place in the sphere of consumer services. But it is in this sphere that many typical problems of social and economic development, contradictions between the management and the managed, attitudes toward socialist property, certain consequences of narrow specialization of labor, and so forth, are manifested most sharply and keenly. In the story large social problems are inseparably interwoven with everyday problems and life is reflected in its entirety and completeness. We are not printing the story to entertain the reader. In our opinion, in this artistic work many socioeconomic contradictions have been more profoundly and completely reflected and more clearly articulated in many scientific articles. And is it really necessary to make a sharp distinction between scientific research of reality and artistic work? Perhaps

the synthesis of artistic and scientific creativity contributes more to the improvement of the society? In order to dispassionately delve into the depths of the contradictions and recognize their sources and consequences—and this is necessary, as was emphasized at the January Plenum of the CPSU Central Committee, in order for the restructuring to become irreversible.

1.

Kolyunya's right leg is thin, like a dead branch. It does not bend either at the knee or at the ankle, and Kolyunya walks by pushing off from the ground with it as with a stick. But more frequently—he runs.

He says, "Cripples will never understand me!"

And with his unique hop he runs to the finishing machine. Upon returning, sitting down lightly on the woven seat of the stool, without losing valuable seconds, he is back to work.

His hands are uncommonly clean for a cobbler; they have no scratches or cuts. Kolyunya calls them his breadwinners and kisses them. He sticks what he has just earned in his apron pocket and says:

"My hands are like gold!"

And he smothers them with kisses:

"Smack smack!"

"Remember," he says to Dmitriy, bending closer so they do not hear him in the shop. "A person with dirty hands is not a master!" And he blinks slyly at Yanchik, who is sitting at the next bench.

Kolyunya revels in the role of a teacher and praises Dmitriy at every step.

"You did not work previously? Perhaps at home, for yourself? No? That is surprising. Yanchik, look, made it the first time—stitch by stitch!"

Dmitriy, encouraged, starts sewing faster. Kolyunya makes a warning sound.

"You are in no hurry! You worry about quality. The quality you achieve on the first day, this is yours for the rest of your life. You cannot learn in an offhand way. As they say, this will cause you a lifetime of trouble."

"Pay a little less attention to your teacher!" the embittered Uncle Seva says gruffly from the corner. "Our first commandment: fewer stitches—the money is the same!"

"Be quiet, over there, be quiet!" Kolyunya becomes stern. "Get your own student—and tell him that!"

"Kolyunya is right," says Yanchik. "Try not to look at us. We are victims of necessity; the faster we work the closer we are to the ruble."

"And we must love rubles!" Kolyunya adds. "If you do not make money you will not live very well."

"And with a life like this who would not make money on the side?" Uncle Seva, grinding and gritting his teeth, tears off a sole which scatters dust and sand after each nail is removed.

"To hell with it," Yanchik consoles him. "Let us get drunk—life will look cheerier."

"Yes, if you do not have a drink in the morning the day is wasted."

"Hi guys!" a reception clerk comes in—young, plump, with pretty, slightly bulging eyes—cheerful and acting as though she had a repellent against anything that might bother her. "Boys, who has that pair—black women's shoes with platform soles, and it was a rush job?"

"Black?" Yanchik repeats. "They were—they were—they were...."

And he begins to dig through the pile. She bends over too. Yanchik, as if from forgetfulness, drops his hand on the part bulging out of the back of her smock and mutters as if trying to recall:

"Wait, wait...."

"You get out of here!" she laughs.

Uncle Seva smiles slightly:

"Look in the place for the finished work."

"Are you serious?"

"I would not put you on, my girl! I put them on the shelf yesterday."

"Aha," she says, expressing gratitude. She finds them and disappears.

"Oh, oh, oh!" Yanchik bursts out happily and stretches. His thick lips burst into a smile and the large fingers on both hands, short, thick and black, like baked potatoes, protrude when he says "Vo!" The shop is pervaded by joy from his openly happy appearance.

The supervisor looks up and smiles along with the rest of them.

"Are we eating at home?"

"Are you asking us to dinner?" Uncle Seva squints his red eyes.

"Rita will not make a fuss?"

"Make a fuss! What do you mean!"

"All right."

"Tell us, tramp! We cannot ignore the rush orders, there is a waiting line!"

"Do not babble. You know that we can—it will cost a pretty penny. But what about dinner? We must break the student in."

"I am in favor of going to Rita's," Uncle Seva says irritably. "Let them charge it to me."

Yanchik pulls some crumpled rubles out of his pocket and spreads them out on the workbench, which is covered with bumps from dried glue.

Dmitriy begins to fidget. He has 60 kopecks which his grandmother had allotted to him for his first work day. When he went to school he would take 15 kopecks, never more. On a pension of 62 rubles the grandmother has learned to keep track of money.

"Sit down," Kolyunya notices his uneasiness. "The teacher pays for dinner, that is the policy."

The prickly smell of vodka spreads over the table. They are pouring out of three bottles at once, everyone for himself according to his appetite. Yanchik taps the bottle, indicating to Dmitriy that he should not be shy in pouring. Dmitriy turns up his nose. He would like to get drunk and overcome his shyness, fully keeping up with the masters, but what would his grandmother think?

"Good boy!" says the tall, slightly stout master who is working on rush repairs. People are respectful toward him—Fedor Ivanovich.

"Good boy!" repeats Fedor Ivanovich, looking at Dmitriy as if he were a person who had something none of the rest of them had.

And the supervisor looks at him with interest. Having taken a good swig he hospitably raises his glass to Dmitriy and says:

"To you! May you feel at home here!" And he smiles. The premature gray at his temples sparkles and glistens.

"But I," says Kolyunya, "suggest drinking to our dear leader. Serezha, as long as you are alive we are taken care of!"

"What a prostitute!" Uncle Seva becomes excited.

"Yes," answers Kolyunya with dignity. "I am a prostitute. And I am proud of it!"

They drink, reach for the hors d'oeuvres, and start talking.

"They rang the bell before dinner, did you hear, Fon-Petya?" Uncle Seva grabs onto the other "rush worker."

Either from drinking or because of Uncle Seva's words, the parasite gesture begins to exasperate Fon-Petya even more—he runs his hand through his smooth black hair, which is divided by a part, and with two fingers he twists his mustache.

"You are licking yourself like a cat! Sit down, aristocrat of the boots, you are choking on all your misappropriation of time and money, but in the shop are we—not people?!"

Having said this, Uncle Seva turns from Fon-Petya and with his bluish arm he beckons Dmitriy to him, and poking his finger in Kolyunya's stomach, declares:

"If he gives you 2 rubles a day—grab him by the throat! He is a sly one, your teacher! They will say that I am the sick one.... They are disrespectful! The old souses!"

Yanchik speaks to Sergey over the noise:

"There are rumors that we have good times ahead. The shoemakers are saying that Mefodiy is going to resell our shoes...."

"Mefodiy?" Uncle Seva moves closer to him. "Resell! If they give him a kopeck more he will sell!"

"You should find out from your Sasha what they need," continues Yanchik, not paying any attention to Uncle Seva. "She works nearby...."

"Yes, I know! For them our 50 percent is like a drop in the bucket."

"What do they want with our percentages?"

"They?" Sergey smiles. "My work is to collect percentages and theirs is to make sure they get their share. Everything else is nonsense, but percentages...."

Signaling that the break is over they are beating down the door, and there are clients at the window. Rita, having griped for a long time, goes to open it. After her, Fon-Petya and Fedor Ivanovich get up looking completely sober. Dmitriy also goes back to his work place. But the shop workers remain at the table and without Kolyunya, he cannot make up his mind to start repairing things and so, having nothing to do, he looks into the reception room.

Rita could not get rid of the people who were forming a line, and the receipts fly out of the book like feathers out of a chicken that is being plucked. Impressed by her fierce concentration, the clients are subdued: they made their requests in a half whisper and refrain from making objections.

Rita smiles to Dmitriy and nods for him to enter. In the line, crossing her bare feet and holding in her hand a pair of panty hose with the mesh part torn off, stands a girl.

"Sew it while she waits!" suggests Rita.

Dmitriy takes it. But where is that confidence he had before dinner? The stitches jump, the thread is cut, Dmitriy breaks out in a sweat.

Then Kolyunya also starts weakening.

"Let's go," he says. And in a couple of movements he completes the business. "Take it. Get 40 kopecks."

"Thank you!" The girl gets up. Blushing, she says:

"How much?"

"Forty kopecks," says Dmitriy off-handedly, so as not to appear unimportant.

Having taken out the coin, she is confused, not knowing whom to give it to—to Dmitriy or the reception clerk? She hands it to Dmitriy, but he directs her to the cash booth, to Rita.

"No, you take!" she smiles festively, as if this were a big event in his life.

"But I should share it, it is not all mine...."

"It is too much trouble to divide it again, do not worry!"

Dmitriy brings the change to Kolyunya.

"Keep it, keep it, this is your first honorarium!"

At the end of the day Kolyunya takes a ruble out of his pocketbook.

"No...." Dmitriy wants to refuse.

"Quiet! Remember, we have this policy: if you eat it all yourself you will get stuffed."

"Where did it come from?!" his grandmother is surprised.

"I earned it," Dmitriy says with proud severity.

"On the first day? You cannot even do anything yet!"

"I mean, I learned."

The grandmother tenderly accepts the ruble; she places it between her palms, and squeezing it, as if warming her hands from the ruble, she says to Dmitriy:

"You are my little master!..."

2.

Kolyunya gets up with the birds. As someone who loves the early hours, the keys to the shop are entrusted to him. Dmitriy does not refuse—he wants very much to get ahead as quickly as possible. Whether Kolyunya comes up in a taxi or in a company vehicle, Dmitriy is already there, waiting for him at the doors and laughing. They quickly change clothes, and with a special sense of harmony—they are the only ones in the entire shop—they work for 2-2.5 hours.

Kolyunya is great in the mornings. He has a wisecrack for every occasion, and he flies into the reception room at the sound of footsteps. Having paralyzed the client with his politeness, he offers him a seat and then he and Dmitriy with their four quick hands perform the necessary repair in a minute. If the client cannot wait, that is no problem either.

"In the evening," Kolyunya says to him, hinting at the secret they will have from now on. "Ask for Kolya...."

Kolyunya initiates his student into the intricacies of "outside orders" thoroughly as if he were carrying out a duty assigned to him by nature herself. He is called upon to learn to give an order like a presentation.

"Here, I fixed it for you." Kolyunya shows the client three nails in the sole. Turning the shoe around on its axis, he says about these same nails:

"And here I fixed it for you. And here I sewed it for you." Kolyunya takes the other shoe. "And here, and here. And here I pounded in some nails." Again the new nails shine. "This will cost 1 ruble, 92." He fleeces him while smiling irrepressibly.

"And why 92?" Dmitriy asks.

His eyes showing cunning and love for his talent, Kolyunya instructs: "Never round off! 92 is the same as a ruble, but calculated precisely down to 8 kopecks!"

Kolyunya does a great deal for the shop. Out of good will, without remuneration. And it is only to Dmitriy, his student, that he is open and honest.

"Do not avoid the public. Whatever good you do in private looks a hell of a lot better in public!"

In the mornings Kolyunya divides up the work. Like a machine gun, he squats down on top of the mountain of shoes received the night before and quickly sorts them, lining them up pair after pair.

"Yanchik! Uncle Seva! Fedor Ivanovich!" he says, looking at the shoes which barely manage to leave the teacher's hand before Dmitriy delivers them to the benches.

"And these—are for us...." he says, making his eyes look innocent, and smacks his lips. Kolyunya always smacks his lips when he has done himself some good.

The masters, when beginning their work day, argue with him to the last minute. Kolyunya listens to their curses, indicating with his entire appearance that he is ready to take this burden on himself: it is dirty work, but let the people unburden themselves.... But at the right moment he gently cuts them off:

"So would you like to come in at 6 tomorrow in order to divide up the work? Go ahead, I will not even touch the piles any more."

Incidentally, anything can happen. The chronically irritated Uncle Seva gets hold of a pair of shoes that are so attractive and valuable that Kolyunya stuck them in the very bottom of one of the stacks, and suddenly without any warning Uncle Seva throws a shoe at Kolyunya, and then another and another and another. And when he is through with this he starts hitting him with his hands.

Kolyunya cries:

"For all my good.... Why? What, cripple? Why do you not answer? You get up before dawn, you just try it...."

They make Uncle Seva apologize, they demand a "peaceful settlement." After a second glass Kolyunya says that he is not angry and during the third he swears that he will never again play favorites when dividing up the work.

When delivering the footwear to the various stops the next morning, Dmitriy notes that the clean, advantageous work is going to Uncle Seva, and he and Kolyunya have just patches and mending. Kolyunya brings the last three pairs himself and puts them on Uncle Seva's bench. They are in such bad shape that there is nothing to hold onto to pick them up—it is nauseating to look at them.

"A-gain!" Uncle Seva, standing in the doorway, clenches his teeth.

Kolyunya blows up:

"You know where you can go!..."

"I will go after you, you slime!" Uncle Seva shouts. "Again you have thrown some crap at me—you cannot make 3 kopecks in a day!"

"Enough!" Kolyunya starts to raise hell. "We will change places! I will take the crap and you will take all my gold!"

"Oh-oh!" Uncle Seva kicks up the shoes. "Oh! Oh!"—he kicks the shoes off the bench.

Kolyunya brings him his work, but also shouts:

"You are a mental case! There is no feeling sorry for you!"

They continue to squabble, but with Dmitriy's help he straightens out the shoes that have been thrown around by Uncle Seva, takes out the orders, signs them and places them on the spindle.

Uncle Seva changes clothes, and with a satisfied sniff begins to sort out his work—what needs to be glued and what needs to be sewn.... But then he stops, he hastily digs deeper and deeper, and then raises his confused eyes to Kolyunya.

"You are smacking your lips...."—he whispers. And then shouts:

"Give me my work!"

"There—did you not see?" Kolyunya gives him the finger. "The work has been distributed and the orders have been signed."

Then, reinforcing the lesson, he repeats all day long:

"You give him the best—is this not right! He is crazy! How he tries to complicate things at every step—he thinks: and it's all the same!"

When Kolyunya gladly replaces the reception clerk he is also being cunning, but more about this later. He teaches Dmitriy the job honorably and enthusiastically. But not only him—all of them teach him. The student is in great demand.

"Cut the sole down to nothing from the inside," suggests Yanchik. "Why disfigure the outside?"

"Look at that seam!" Uncle Seva impatiently responds, "tomorrow the tongue will tear. Glue it and it will stay tight."

Dmitriy is only there for the summer. As soon as they have shown him everything, it is time for him to leave.

Kolyunya struts around:

"My student! My school!"

And he is jealous:

"Why are you running away?! Look, the great masters! Let them first learn to be students!"

"Kolya, Kolya!" sighs Fedor Ivanovich. "Nobody knows whether we will ever get another lad like this. And we have invested money in him. And he will go to somebody.... Or does nobody need what we can do?"

And another time he says:

"You, Kolya, can be offended or not, but I am going to go ahead and teach him to sew new things."

Demonstrating their brilliant mastery for Dmitriy, all the rest of this time they work hard in the shop.

"Why?" Dmitriy once asks.

"Why?..." Uncle Seva has a mocking expression. "Because they have locked us in! Who sees me? Who knows me?! They have thrown me in here like in a jail so that it will be more convenient to take their percentages from me! But I still try, and put out a couple of pairs—yes!!"

As soon as the receiving clerk is out the door, Kolyunya is glad to take over the receiving office. And here a flow of unauthorized work rushes into the shop like out of a cannon."

"Clean off the heels!" Kolyunya announces on the run. "Who? Quickly! They are sitting and waiting!"

And then the master's report about the work that has been released:

"Write down 80!"

But everybody knows that they got no less than a ruble.

Concerned about the mood of the workers, Kolyunya carefully lures young clients into the shop:

"In here, in here, I ask you!... Sit down! Please!" he offers his little stool and placing his stiff leg by the bench, squats down, takes a measurement, looking like an extremely hard worker. Not too much and not too little—satire at the knees of a nymph.

The girl's cheeks flush and her ear turns a transparent pink.

"What are you doing...."—she shrinks from his affection.

"It is nothing, nothing, nothing!" Kolyunya does not listen to her. Servilely sticking out his little finger and not forgetting to cast dirty looks at the masters, he unbuckles the shoe, takes it off and, without letting the little feet with their polished toenails drop to the floor, he holds them in his hand.

"Ach, so!..."—the girl's eyes have turned haughty and cold. And the feet, which had just been drawn back in confusion, now competently and demandingly lie in

Kolyunya's hand. Kolyunya goes into rapture, but soon starts to look around for an object worthy of replacing his hand. Yanchik gives him a newspaper. Kolyunya grabs it, blows on it, straightens it out and only then, like a couple of good little animals, places the girl's feet on it.

"The heels!" he hands the sandals to Dmitriy, and eagerly smacking his lips, with a leap runs into the reception room.

"Yeees!..." Yanchik begins the eternal conversation. "If you have a son, young lady, whatever you do do not let him be a shoemaker!"

"Why?" she smiles and shows her sharp little teeth.

"And it is always the shoemaker that is to blame: drunk as a shoemaker, swears like a shoemaker! What do you shout when the film breaks in a movie?"

She starts to laugh, sticking out her opalescent little tongue, and her freckles light up mischievously.

"That is just a proverb, but real shoemakers are even rather nice!"

"True?"

"Of course!"

Yanchik sticks out his chest and his greasy eyes bulge:

"Could we meet again.... Sometime when I am not working?"

"Your wife will not let you go."

"Why? One has to fight against one's wife. The worst enemies of the shoemaker are his wife and his sedentary work. What is your name? Mine is Yanchik."

"Pleased to meet you. Anastasiya."

"That is—Nastya?"

"Yes, Nastenka."

"But you are not from our glorious city!"

"No, I am not. I am studying at the tekhnikum here. How did you know?"

"You learned to say 'Pleased to meet you' from us!"

Uncle Seva mutters into his beard:

"One can also hear that here. If one tries...."

"Ready!" Afraid that Uncle Seva might say something else, Dmitriy announces loudly.

Nastenka says softly:

"Thank you!"

And putting on her own shoes, probably so that it would be easier for Dmitriy, asks formally:

"How much do I owe?"

"Two tickets to a movie!" answers Dmitriy, having learned the shop formula.

"Whoa!" Yanchik picks up the conversation excitedly. "Right to the point! I—all right, but here Dimych.... Our Dimych is such a chap...."

"But what kind?" she looks at Dmitriy undisturbed, with bold cunning.

"Love for repair work?" Uncle Seva thinks out loud after Nastenka leaves. "We shall figure this out ourselves!" Dmitriy snaps.

"I would not have trained him," Uncle Seva responds not to him, but to his ideas. "A movie is a movie, but women will get you in trouble!"

At 5:30 Dmitriy takes his coat. Kolyunya wheezes with embarrassment, and then, like a person who finds it embarrassing to remind someone of a debt, says:

"Maybe she will come—and then?... And she might not show up, but you...."

Silently Dmitriy takes the broom to sweep up his work place. Kolyunya is sorry:

"You are right! We do not see life beyond this work. Starting at 6 in the morning you do not look up, and this does not seem to be enough. But on the other hand.... Now the people are rushing in, the time is right and you should not be caught sleeping!..."

With a small rag Dmitriy dries off his soapy hands. After he changes clothes, he sits for a while in the receiving room and then returns to the shop.

"Is she not there?" Yanchik asks, perking up his ears. "But it is time...."

Kolyunya laughs, and Uncle Seva also chuckles.

"Yes...." Yanchik starts to breathe noisily, pulling on a thin heel. A coating, the color of baked milk, drips from his fingers, covered with brown spots. So that was done. Taking a critical look at the prepared heel, Yanchik spits on it twice and energetically wipes it on his chest and his shirt. The coating, as if by magic, restores the color. Yanchik smiles brightly, puts the heel on the shelf and took it down again!

"Yeees...."

"That's enough!" Uncle Seva cannot stand any more. "The boss waylaid your girlfriend and they are shut up in the office. What is he doing—he is not tied to his stool!..."

Dmitriy, blinking helplessly, looks at Kolyunya and then at Yanchik. Kolyunya casts his eyes down, concealing a grin:

"Never mind, it is a sacred duty to share with the boss!"

"Oh, you scum!" Sergey says from the corridor.

"I—on the contrary!" Kolyunya hastens to add. "I said that it was sacred!..."

"Dimych!" Sergey calls Dmitriy. "Listen, she is such a busy child...."

Dmitriy has no answer.

"Have you made specific plans with her? Come, let us sit for a while in my office. We have music, and we will have something to eat. Okay?" he pulls out some money. "Run over to the girls in the 'Aquarium' and get a bottle of Ukrainian wine, some champagne, and for an hors d'oeuvre, say, Serezha asked for his usual. They know what it is."

"Hello!" says Nastenka, with a barely noticeable look of guilt. "I have been listening to music with your boss...."

Her eyes next to her violet earrings seem blue and flashing.

"Let me help! I love to set the table—it's terrible!"

She slices the sausage thin and places the slices in the form of a flower on the plate, enjoying this.

"Does it not make any difference that they are working out there and we are here...?"

"They will not disturb us," Sergey placates her.

"But it seems that I have caused a disturbance!"

"But who would permit you to sit out there when you have something to do here?!"

"Would this be included in my duties?"

"And not only that."

"Hmm! But what about the saying that you should not play around where you work!"

"Our most hypocritical saying, Mama! Where should one play around if not at work? And the more so for a shoemaker who spends his whole life in the shop?! What can I give you to drink? Champagne?"

"No, that gives me a headache."

Sergey pours her some vodka. He fills it all the way up.

"Phoo! You lure a girl in and this is what you give her!..."

"Baby, I like you! To you!"

"No, to the shoemakers who spend all their lives in the shop!"

She drinks easily and heartily—like it is soda water on a hot day. With two little fingers she takes a slice of meat from the plate and places it in her mouth.

"But why does Dima have to drink water?"

"He is a confirmed teetotaler."

"Hmmm," she says, indifferently, as it seems to Dmitriy. Then she says:

"Is it his duty to have dinner with the boss?"

"Child, you have a sharp tongue!"

"No, no! I just want to know. I have to go to work soon also, under some kind of Serezha."

"Well, baby, wherever you go you cannot get away from them."

"But are you not ashamed to take advantage of this?"

"How can I say this.... Everyone wants to trick destiny. And it is easier to maneuver from the boss's chair. And I am on the very bottom of the ladder but I experience it all."

Sergey reaches for the bottle.

"How interesting!..." Nastenka catches sight of his watch.

Sergey unbuckles the band.

"Well, play with it. Women are crazy when it comes to things like this."

"And men?"

"And men too. What can you do, it is a sign of distinction. It is convenient: you put it on and everyone can see what kind of a person you are."

"Hmmm, one might think that you do not like this!"

"Me? On the contrary! That is all I live for. What am I without my trinkets."

"You? You are the boss."

"But what is a boss if he is not a person who has the capability of buying trinkets?"

"I do not know."

"I do not know either. Let us take a drink and then it will all become clear."

They drink.

"Did it become clear?" asks Nastenka, coyly batting her eyelashes.

"It became clear. The boss is the result of public deception, which will inevitably be disclosed, and then they will cease to exist as such. So I am a future failure. Or better, a failure out of the future. Yes? So?"

"That is boring," Nastenka is already nodding her head because of the drinking. "And this tape recorder and tapes of the failure—these are successful!"

"Let us try."

"Dim, shall we dance? Dim!"

"I do not know how," says Dmitriy hoarsely.

"You do not know how. Just listen to the music—what is there to know how to do?"

Drunkenly, she begins to move, she gets Dmitriy to stand up and presses up against him.

"Forgive me," she whispers, her words forming a melody. "I am bad, I am a slut. You are good...."

Her lips burn Dmitriy's neck, his breast becomes empty, and he becomes weightless and shaky.

The shop is empty and he does not understand when or how it happened. The smell and glue and leather locked up in it flow through the corridor and into the reception room.

Nastenka does not feel good, and Sergey leads her to the toilet. Dmitriy can hear her retching, then washing herself. His heart burdened, he distinguishes their unclear voices and breaks into a shout:

"Stop! This is revolting!"

She staggers around and collapses, hanging on him. Dmitriy grasps her bare back and is horror-struck.

"Sit me down...." she moans.

Dmitriy falls along with her onto the flat divan that is part of the set of the furniture for the receiving room. He holds her, but he does not have the heart to look at her.

"How is she?" Sergey appears, looking pale with a tired glitter in his eyes.

"She has had it. Why did you undress her?!"

"She did it herself. She did not want to get her clothes soiled. She is barely alive and look how she has folded it—seam to seam."

"And the rest?"

"Why does she need the rest?"

Sergey squats down and moves her wet hair out of her face:

"She is maturing.... So much beauty in one piece!..." He rapturously moves his hand along her neck and shoulder. Dmitriy jealously turns her toward himself. Sergey forces himself to smile and stands up.

"We have gotten the girl drunk! What shall we do? You cannot throw somebody like this in a ditch. Or leave her here? Do you want to spend the night with her?"

"I would—but what about the old lady...."

"Who?"

"My grandmother."

"Just tell her that the communications broke down and they left you in charge here?"

"Yes. Material values! My grandmother believes firmly in that."

"I will drop by. Lift the girl up, we will fix up a place for her to sleep."

He moves the divan and pushes his armchair up to it.

"It will be comfortable, this is a tested variant."

Dmitriy lays Nastenka down and covers her up with her jumper.

"Spend some time here," said Sergey. "I will not lock up, and you can slide the bolt from here."

"Ooh! Ooh!" Nastenka stands up complaining.

"Can I give you anything?" Dmitriy asks.

"Get rid of that light."

He turns off the light and stands by the switch.

"Dim!" she calls. "Hang up my jumper! Smoothly. I cannot stand to have it crumpled...."

Dmitriy straightens out her jumper on the back of the chair, takes off his shirt, and covers Nastenka up.

"Lie down," she requests. "My head is spinning!... I close my eyes and it is like a merry-go-round. Hold me, be a man!..."

Dmitriy stretches out next to her and his head falls, like into a pillow, into the softness of the chair next to her head. He covers her hand with his.

"Mmmm!" she moans gratefully. "And I implore you: do not bother me, I cannot move now...."

Dmitriy has no intention of bothering her. He cannot get rid of his feelings: her entire arm, from her warm fingers to her cool shoulder, are under his hand. He closes his eyes, and when he opens them it is already light. He stretches to get up and then stops with his neck extended tensely: there is her cheek with its tiny freckles, the smooth cleft in her chin, her thin, smooth, shoulders and her pointed breasts sticking out as though they were on springs.

Nastenka turns on her side, rubs her eyes, and shaking off the sleep she opens them. Now they are a very pale green.

"Your eyes are chameleons," Dmitriy whispers.

"I know," she answers in a whisper. "And yours...yours are somehow not anything."

And she smiles:

"No, they are nice! But how—one cannot say. And you also have a mustache. Have you not shaved yet?"

"No."

"Can I touch it? Hee-hee! It is like a little brush."

Very nearby, as though right over him, the key turn in the lock. Nastenka's eyes look attentively, and then they become gay:

"What is that?"

"Kolyunya has arrived, my teacher. But the door is bolted."

"Hee-hee! Get up!"

"I do not want to."

She presses her lips to his and without taking them away says:

"Get up, you must!"

"No: I will not let anybody in!"

She kisses him madly, letting him feel her lips, her tongue, and the cutting edges of her sharp little teeth. And as they are kissing, she falls off the divan. Jumping onto the floor, she slips into her jumper, removes a speck of dust from the corners of her eyes with her fingernails, straightens out her hair and then, looking as though she had just washed it, combs her hair.

They open the door for Kolyunya together.

"My children!..." Kolyunya bursts out.

Nastenka, without embarrassment, extends her cheek to be kissed.

"I shall take her home," Dmitriy half-asks and half-informs his teacher.

3.

The gesture of a traffic controller pointing toward a new bench, Kolyunya blocks Dmitriy's way:

"And then to the lesson. Master! Everything the cripple knows has been shown to you."

On the bench are cutting instruments, a gift from the teacher: a short one with a cutter/ripper for tough heel material; one that is protruding made of a broad cutting strip—for fine finishing; a long one sparkling magnificently, sharpened with a groove, like a razor—for making thin slices from soft material.

Uncle Seva pulls a little hammer out of a box—for old manual work, it is all darkened and dull except for the pounding surface, which sparkles like a mirror.

"Breadwinner!" he says ceremoniously. Winking, he adds:

"I got this from my father, and it was awarded to my father by his teacher for his rare talent. Well, work hard, this is a happy hammer. And look!" he almost shouts. "Don't take the instruments with you when you die! Pass them on to able hands."

Tears come to Kolyunya's eyes.

"Seva! You are outdoing me, the teacher! And that is not very nice of you, but I am glad: for my student, it is my pride!"

"Here," Yanchik gives Dmitriy an Ambuz, a shoemaker's iron. "As they say, the shoemaker guesses and the Ambuz irons!"

"And I," says Fedor Ivanovich, "with an eye to the future, I have here a knurl and a set of cutters. To put the finishing touches on a new pair of shoes. Sit down for a minute and I will teach you something new. You grasp things quickly, and something new is always a piece of cake."

"Holy words!" Fon-Petya joins in. "Our business is capital. Whether there is war or destruction, a shoemaker needs only his hands and something to sit on. He earns the rest! But the main thing in any business is success. And here...."

He works up some saliva, spits on a new 10-ruble piece and places it on the bench:

"Here you are! To your happiness!"

"Have you seen these heathens!" Sergey laughs. "Well, and then there are the girls." He drops an envelope in Dmitriy's apron pocket. "Do not get drunk at dinner-time, boys. The work has come and we cannot brush it aside. Around quitting time Kolyunya will call us together and we will baptize a new master."

They go in. Kolyunya, his gold teeth sparkling, as though he were dancing—toward the measurer, a well-groomed plump woman who, upon seeing him, gets up and opens up her arms to hug him. And the orchestra steps up the melody and a singer through a loudspeaker fills the room with music:

"Kolo-kolo-kolokolchik, Kolokolchik—blue color, What am I, what have I done— Fallen in love at this age!..."

Kolyunya raises his hand high, demanding attention.

"Ah, Kolya, Nikolasha." I fell in love!..." the singer admits tenderly and says: "We welcome our dear guests—people of that rare profession who are responsible for the fact that the residents of our city walk confidently on their feet."

Kolyunya is already twirling by the orchestra platform and he kisses the singer's hand, into which he presses a 5-ruble note. He approaches the table hugging a broad-shouldered woman in a sleeveless blouse.

"Rayechka, we are a close circle as always. We wish to sit a little while—you know how to play the hostess. But first let me introduce you: my student, my pride! Today he has become a master."

Dmitriy stands up and smiles for the waitress. He is not himself: he has already had too much of everything for one day. He does not know what his hands are doing—one time they are pounding the fork and the next time they are pulling threads out of the tablecloth. He wants to follow them but he is distracted by Nastenka, who is excited by the way they were greeted in the restaurant and how they are the center of attention as soon as they

come in. Dmitriy says something to her in response, happily thinking that in choosing his occupation he has hit the jackpot: he has ended up with generous people respected by everyone and—so soon!—has become their equal! Now and then he would feel the contents of his pocket. The 10-ruble note from Fon-Petya, the gift from Sergey and the receiving lady, and even Rita did not give him a breather from everything else, and in the end for his 50 percent he receives 21 rubles. No, whatever he might say, in his pocket he has real wealth. And every day in the future would add to this wealth and from this he himself will become more independent, more respectable, and have broader demands and capabilities....

Kolyunya, having broken into a sweat, all nervous and happy, sits down next to him:

"Your teacher," he boasts, "has worked here too! In the coatroom. I used to stand there, just stand there...like a fool. They would put 15 or 20 kopecks in my hand.... I think you are a decent gentleman! Just so Kolyunya does not twist you around his finger?! I conclude a mutually advantageous contract with the girls and hide half of the chairs from the room under my counter. Our elite of thieves slips in here toward evening, but the chairs—where are they!... The girls hint that they should ask at the cloakroom. And for a moderate payment I am prepared for anything: a ruble—a chair, a ruble—a chair.... If something bad happens—what can you ask of a cripple?! At that time my leg was bent and I walked on crutches. It wasn't until later, after eight operations, that they straightened it out. Ah? Of course, let us drink: the first toast to me, to the teacher! Dimych, son, let us drink!" Kolyunya raises the bottle. "Nastenka, daughter, what about you?"

"She cannot," Dmitriy pushes the bottle away.

"Right," Nastenka crosses her arms obediently. For this evening she has taken on the role of a modest girl and her half-closed eyes holds the attention of the entire table, who are noting how her presence is affecting the behavior of the man. Only Uncle Seva is not under her spell. He is also indifferent to the hors d'oeuvres.

"Kolyunya," he says, when everybody is eating, "and why did we drink to you first and not our dear supervisor?"

Sergey screws up his eyes:

"Is that the way I am treated?"

"These chickens!..." says Yanchik, breaking apart a flattened-out bird with his dirty fingers. He says it as though emphasizing that he has not heard what they were talking about and did not want to hear. "You always alternate between the same things.... I ask to be excused!" He nods to Nastenka gallantly.

"But before they leave Minutka they take away 60 percent from the shoemakers!" Uncle Seva declares, looking at Kolyunya.

Kolyunya chokes and coughs.

"I am in favor of operations," he touches Dmitriy. "From here, from the cloakroom, I joined the shoemakers. And one of my clients is the surgeon himself, and his wife is with him. I did one job for him under the table and then another—we became acquainted. He looked at my leg. 'I cannot promise to fix it completely, but I can make it straight.' I went for it—cut however you wish!"

"Yeees," with an unwavering hostility Uncle Seva holds his own. "They would take 60 percent from me: 60 jabs in the gut!"

Fedor Ivanovich, with the sad smile of a person who knows his subject thoroughly, says:

"They learned their arithmetic well in school. Our wage percentage will drop and they might leave less for us in under-the-counter work as well. Only 10 years have passed and things have changed before our very eyes. When we were receiving 35 percent of the contracts, 70 percent went for under-the-counter work. Then the wages were 25 percent and the other work was 50 percent. Now with wages of 12 percent we are glad to get 40 percent under the counter."

"And what is the reason for cutting our rates?!" shouts Uncle Seva, bristling. "A vise, a knife, a hook—we are working the same now as we did 10 years ago! Or have we been given an electric hammer!"

"And you are asking me," says Sergey. "Am I the one who is taking your percentages away?"

"And I shall ask!"

"Go ahead and ask," Sergey's eyes become lackluster. He makes a show of acting indifferent. "And I will answer. We must show our work in such a way that it will be obvious that the output from the shops is increasing as a result of our efforts. I mean legal output. And after it the under-the-counter output will increase—that is only natural...."

"Natural?!" Pushing away the dishes, Uncle Seva reaches toward him across the table. "So that by the sweat of our brows you can loaf around and get fat?!"

"Excuse me, but we do not just think about ourselves—we have not forgotten about you. You sit there cool as a cucumber with that look on your face because you do not have to face the clients, you do not have to deal with the complaints, you do not have to go through the inspections! And what have you risked, what have you invested in the shop?..."

"And you?! Have you invested something?!"

"I have not invested anything either, but I—have been placed!" Sergey looks directly at Uncle Seva with laughing eyes. But soon the laughter leaves his eyes and they become melancholy and no longer look at Uncle Seva.

"Sit down, why are you twitching!" Sergey says in another voice, tired, and colorless. "Well, we yell at each other, and then we drown this in vodka and whatever will be will be."

"There are people around, and you have such conversations!..." Fedor Ivanovich mutters.

"Let them know!" answers Sergey. "It is a pity: can we not gather together and show everyone who is participating in the business! You, Fedya, wise guy, alluded to my knowledge of arithmetic...."

"I did not mean...."

"Well, all right, whether I did well in school or badly and whether I am in charge or someone else, it will be 40 percent. I did not think this up—do you understand?!"

"And speaking about you...."

"Enough!" Sergey stands up. "Shall we pay? All right, and we will gather tomorrow. I am out of here. Farewell, everyone, and do not go too far!"

"You are so stubborn, Seva!..."

"You know where you can go.... And your Sergey as well!"

"Fool! If it were not for him—we long ago...."

"So he turns out to be our benefactor! I did not know! They did not punish us, I did not know!"

"What can you ask of a sick person!" says Fedor Ivanovich to the side.

"I want to dance!" Rita interrupts Yanchik, who has decided to enter the conversation about percentages.

Yanchik raises the napkin from his knees, plunges his plump mouth into it as though it were a towel, wipes his hands and, assuming an air of importance, walks up to the orchestra.

"And I want to as well!" Nastenka pesters Dmitriy.

Buttoning his jacket over his protruding belly, round like a ball, Yanchik shakes his uncombed, sweaty hair, and bows:

"Seven-forty, little Rita, let's go!"

"A sack! A log!" Nastenka pinches Dmitriy painfully.

Fon-Petya runs his hand through his hair and smooths out his mustache:

"May I?"

Nastenka takes wing, with delicate steps floats onto the dance floor.

"Are you listening?" Kolyunya taps on Dmitriy's plate. "They lay me down, put a gas mask in my face, and put me to sleep. They began to cut carelessly on my leg—and I woke up! What a commotion! The dose did not hold me for a minute. This did not phase you? Of course it did! And how! But I cannot operate without anesthesia. And I said, go ahead and cut, and if you do not make the leg straight I will hang myself! I was already dreaming about how I would go walking with Tanyushka: and she would not hide with me behind the gifts in the corner at Svetlana Georgiyevna's house. And I would dance with her—like Yanchik...."

Sticking out his chubby little finger and shrugging his shoulders, Yanchik looks with cheerful surprise at his legs in his pants that are wrinkled at the knees, which jump as if of their own accord.

"And what is wrong with me?! If I die give me a healthy leg!" He takes hold of it: "I make noise, I talk—drive them away from the table!"

Kolyunya's voice breaks.

"Shall we drink up?" Fedor Ivanovich suggests. Kolyunya nods.

"They button me up—at one time they used to button up ice skates that walk away, the ones with the broad blades, and there you are!... They took apart the leg—simply, like it was some kind of a shoe—with a saw: Rrrrr! Rrrrr! and I went under. When I woke up, the operation was over. It was done! It was painful and uncomfortable, but I was in seventh heaven. It grew together there and they removed the cast. I could see that my doctor was not pleased. He rejected it. After the second operation, it began to rot under the cast. At the table! And again failure, and again...eight times! Eight!"

Kolyunya goes for the bottle.

"Have you not had enough?" Dmitriy says carefully, as if taking care of a sick person.

"I know when I have had enough!" Kolyunya jerks back stubbornly. He drinks and quickly licks his lips.

"That was an embellishment, my dear student. This is the main thing. One must lie in bed for a while after each operation. More than a month or two. I had nobody in the city. I had saved up a few kopecks before going into

the hospital, but I had no idea it would take so long. On holidays I had gifts for everyone, well for the nurses every day—this is a sacred duty, and I was the first to cheer up the others in the ward. Well, and a little money came. The hospital fund stopped paying me, there was a lot of red tape with the pension, and it was such a small pension anyway! Yeees, yeees.... I learned so much in that hospital.... Enough to last me the rest of my life!..."

"There!" Kolyunya rubs his fingers together bitterly. "That is what everybody needs from us! And when your training is over, you will find out how much you are worth in and of yourself. Nothing. Not even that: you are worth minus the amount you earned yesterday. Minus! A burden! Worse than a dead person! So Dima, that is the way it is, son. People! Peo-ple.... Rob them wherever they are! If you want them to love you, look them in the eyes and rob them!"

After falling silent, Kolyunya sinks down and dozes off. Yanchik gives Rita a slobbery kiss and talks her into leaving.

"Let us go too!" the mobile dimple in Nastenka's chin mutters in boredom. Dmitriy shakes his head no and indicates his teacher with his eyes.

"Are you going to take Kolyunya?" Fedor Ivanovich asks. "And I will take Seva."

"Nooo!" Kolyunya, insulted, wrenches his elbow away. "I will go myself! I always do everything myself! You cannot put a cripple in someone else's hands: they will hold him and hold him and then drop him."

Dmitriy holds onto him even harder.

"Get your hands off the cripple!" Kolyunya breaks away, quickly lunging to the side, with his stiff leg, and falls down, stepping on the edge of the hallway runner. A truck goes by, sounding like a thunderstorm in the mountains. Kolyunya bangs his head on the side. There is a crack of wood and Kolyunya ends up out on the sidewalk.

"Ha!" Nastenka cries almost inaudibly.

"Do not yell!" Dmitriy says loudly. And he looks around. The street is empty, a truck is flying by using all of its horsepower. Dmitriy presses his trembling hands. He hears the breathing of someone sleeping.

"He is alive!" he whispers to Nastenka. And for himself as well too.

"The drug store!" says Nastenka. And without a pause, but with a reproach, as if to a slow-witted person, she repeats:

"The pharmacy!"

"Right—to the drug store." Dmitriy carefully takes Kolyunya under the shoulders and tries to raise him up. Kolyunya, as if helping to undress himself, slides out of his clothing. Cursing and no longer trying to be careful, Dmitriy jerks his teacher by the arms and carries him—limp and sagging.

The gloomy woman on duty takes them to a small bed and a cotton ball soaked in liquid ammonia appears. With the face of a swindler who is pulling the wool over the eyes of his comrades, Kolyunya, nonplussed, exudes an intolerable odor. He does not wake up quickly. But—with a leap. Suddenly he is sitting on the bed—disturbed and completely sober.

"What happened?..."

A black market rafik takes them to Kolyunya's home.

"A free drunk!" Kolyunya smiles. His gold teeth reflect the greenish neon light and his bandage sits like a turban on his head. "Not for a moment!"

"Give me the keys," says Dmitriy. "I will open the shop tomorrow."

"Whaaat?" Kolyunya is offended.

"Let's take a rest! Everybody is brave when they're drunk. You bang your head that way...."

"A shoemaker does not worry about his head," Kolyunya says severely. "It would be sitting on your butt. What? Where are you going! And who is going to protect me from my wife, who will verify that I was in trouble?!"

Kolyunya rings briefly and then makes a motion as though there were electric current in the button. And he waits, listening intensely. His eyes look in the direction of a noise behind the door. Someone lifts the cover from the peephole, jiggles the lock, and sharply, like a gunshot, slides the bolt over.

Kolyunya looks around anxiously, asking his companions to be attentive. Out from behind the door, which still has the chain on it, there comes a hand. Kolyunya puts 10 rubles in it—the hand disappears, and the door opens.

"Mamochka," Kolyunya says cautiously to the back of the woman who, dragging her robe across the floor, disappears into the darkness of the apartment. "I—do you see?—a catastrophe has befallen me!"

"That happens with you."

"No, look how they have bandaged me up!"

"Kolya," an irritated voice responds from the darkness. "You already know how early I have to get up!"

The guests back up. Kolyunya grabs onto them and starts talking:

"It is nothing, it is nothing! The main thing for us is not to bother the landlady."

A rose-colored sconce lights up and the entryway becomes wider and higher. One of the walls is covered from floor to ceiling with the enchanting beauty of a built-in piece of furniture with a multitude of doors, drawers, moving windows and a large mirror framed in fretwork.

"Take off your shoes!" Kolyunya whispers in an agitated tone. "You wear slippers here. I did it myself! Put them on, put them on! They are made of bear fur. The fur disintegrated and I made slippers out of the whole pieces. Well? What do you think? They are soft, right? Let us go, it is late, or else I would show you the entire apartment. We will go into the kitchen. Faster, faster!" He guides the friends onto a red rug made of soft threads. "Have a seat!" he offers a shiny white armchair with red upholstery. "Well? How am I set up? In a word, eat, drink and be merry!... Well?" he asks again, searching.

"Basically my wife tries," says Kolyunya, opening the refrigerator. "She must work and do the shopping.... She is a treasure! The entrance ticket—did you see?—her idea! I come home from work and slip it into the device!"

The refrigerator opens up unwillingly. With timid haste, Kolyunya offers:

"Would you like a Pepsi? And I would like a little vodka."

Having poured them, he looks over his dirty hands and the suit in which he has been lying on the pavement, and he sits on the arm of the chair. He drinks thirstily. He immediately pours another one and mutters, swallowing slowly and loudly, the vodka infusing him and his eyes losing their color.

Kolyunya does not say anything more. Running his hand over the bandages, which are soaked with blood, he moans sleepily. But still he sits there tactfully, with the humble delicacy of a person who is dirty and knows that he is out of place where it is clean.

His grandmother slams the frying pan on the stove and bangs the lid from a large casserole on top of it.

"She is angry," Dmitriy understands and goes quietly to the kitchen to wash up.

"Did you oversleep, streetwalker?"

The grandmother's quick eyes pierce into his very center.

Dmitriy notices with surprise how small she is and how much that is childish has begun to appear in her moods, for example, in this anger.

"Gran," in order not to justify himself, he begins with the joyful news. "They have promoted me to master!"

"Master shmaster!" the grandmother mutters.

In the frying pan she is heating up two spoonfuls of yesterday's kasha and a cutlet. The grandmother peels a baked potato that is left over from yesterday's soup and, cutting it up, places it in the frying pan next to the kasha. That is for herself. She also breaks one egg into the frying pan—for Dmitriy—thinking that he did not have enough breakfast. She takes a dried piece of bread from the rack in the oven for herself.

"Gran, stop trying to live on dry bread crusts! All your life you have barely eaten enough to keep going. Do you know how much I earned yesterday?"

Grandmother—tensely knitting her brows so as not to smile out of weakness—instead of answering, loudly bites off a piece of dried bread with her worn but still strong teeth and sticks it in her cheek like a fruit drop.

Having pulled out the money, Dmitriy slows down. He wants very much to surprise his grandmother with all that he has. But if he gives it to his grandmother he would never get it back, and he still has to settle up with Fedor Ivanovich for the restaurant. Wavering, he decides to give her only what he has earned—21 rubles.

"There," with the lightness of an experienced person he drops the money on the kitchen table. "For one day I earned this!"

The grandmother forgets that for purposes of education she should still be angry with her grandson, she walks toward the table, and then she raises her frightened eyes:

"Grandson, it is impossible to earn this much money...."

"But I earned it!"

"It is impossible, grandson. No worker is paid this much."

"You know what, Gran!... You are behind the times! Everybody is earning money, and you...."

"I am not interested in everybody, I have one grandson."

"So?" shouts Dmitriy. "This is not necessary—I will deposit it for the plan!"

As if leaping, the grandmother quickly takes the money.

"We—do not need it?! The fence is about to fall down, and everything in the house needs repair!... If we have a chance, we must take care of all this."

4. "Inspection!..."

The receiving lady Valentina is a solid, broad woman with a mobile, ducklike nose and eyes that never look straightforward—at a moment of danger she surrounds herself with a cloud of suffocating underarm deodorant.

"So," says Sergey. "Do you have everything in order here? But why are you trembling? Sit down and work calmly."

"Hello!" he goes up to the inspectors—simple and polite. "Oh! What a charming inspection!..."—he gives one of his smiles which are addressed to attractive women but come from men who know that they cannot be unpleasant to these women.

The younger one, still just a girl, casts her eyes down and then looks questioningly at the older one—judging from the lack of a wedding ring she was unmarried, about 30 years old, a womanly brunette with a juicy mouth and eyes inclined to dim over. Sergey understands that this is the one to worry about, the younger one is of no account.

"Let me introduce myself. I am Serezha."

"Yelena Nikolayevna," the elder one introduces herself in an emphatically official way.

"Zhanna," says the younger one, smiling. And then she wipes the smile off her face. "Zhanneta Yakovlevna."

"Very pleased to meet you! No, I really am pleased! You know what kind of women they usually send to inspect us...."

"We are not very interested in that."

"Well, relax, girls, feel at home!"

Yelena Nikolayevna looks at him as one would look at a poor artist and said:

"That is not necessary! We came to work and let us not worry about arranging relations."

Sergey acts as though he is thinking.

"And is there really anything more important than relations among people? It is an unforgivable mistake to divide relations into fiscal and human."

"Thank you. We will keep that in mind. But still we would like to get to work."

"Help yourselves! What should I do—help you or not get in the way?"

"Not get in the way."

Yelena Nikolayevna goes into the shop. Her greeting sounds like this:

"Yes, I am sick of this procedure. But the fact that I do not like it still does not mean that I will not do everything completely or that I will stop before making it unpleasant for you."

"These shoes, please, and the order for them!" she points with her pen to one of the pairs that are lying on Uncle Seva's bench with the soles face up.

Uncle Seva drops his inflamed eyelids.

"Daughter," he says in a strained way, "that pair is for show and they do not pay me. Here are the papers." He takes a bunch of orders out of his hat. "And here they are. Go ahead and do your work, dig around in it!"

"How you talk?!"

"I talk?..." Uncle Seva begins to wheeze. "What if I were to chuck you out of here without any talk, so that you could fly, whistle, and be happy?!"

Having smiled with satisfaction, Sergey gets up from his desk in the office.

"Why did you jump in here?" Uncle Seva begins to pace up and down. "To get on a working man's nerves? Get away from my bench! Get out of here, I said!"

"What, what does this mean?!" Yelena Nikolayevna addresses Sergey.

"A sick person!" Sergey soundlessly shouts from the corridor, using only his lips. "A contusion! A disabled war veteran!..."

Having convinced her to leave the shop and leading her by the elbow into his office, he starts to talk fervently about their common attitude toward these unbalanced, repulsive people with whom they had to make peace somehow or else they would get nobody else.

"I was motioning and motioning to you, but you paid no attention! He is sick—you understand? Twisted. And the main thing is that there is nothing you can do with him: his nerves were wrecked in the war...."

"I have nothing to do with your exotic contingent! I came to work!"

"Go ahead and work! Do you really think I have anything against that!..."

She resolutely turns toward the shop. She flops down next to Kolyunya. With revulsion she takes hold of the worn-out shoe that smells of someone else's feet.

"The order, please."

From a bag like the ones in which children carry a spare pair of shoes to school, Kolyunya pulls out a bundle of orders and puts them on the bench. Once they are not held together by the bag, they spread out as if growing from yeast.

"We wanted to be quick," Kolyunya blinks obsequiously. "What number do you want? So, so"—after each word he licks his fingers and leafs through the papers. "Black men's shoes.... No, not that.... Aha! Not there...."

"Stop acting like an idiot!"

"What?" Kolyunya asks, making his face look even stupider.

"Sto-o-o-p!"

Kolyunya jerks his hands away from the orders and presses them to his chest—like a puppy holding his front paws when he is begging for a piece of candy.

"No, I will get you!..." Yelena Nikolayevna hisses. Giving a dirty look to Zhanna, who is wandering after her, Yelena Nikolayevna, impatiently twisting her entire body, jumps into the receiving room.

"What a woman!" Yanchik breathes, following her with his glassy eyes.

By noon a whole mountain of shoes has been piled up on Valentina's desk. For each pair there is an order and they have to be taken in and inspected.

Yelena Nikolayevna would take out a suspicious pair and give it to Zhanna. Taking the shoe and holding it with two fingers she would carry it to the office. "It is good," thinks Sergey, "that this Fury has set herself up in Valentina's receiving room and not Rita-Bandita's...."

"You always charge for sewing in addition to the half-sole," Yelena Nikolayevna begins in the office. "Although reinforcing the old sole is included in the cost of the half-sole."

"Intelligent!"—Sergey thinks, feeling his old military zeal.

"How can one put something larger into something smaller?" he says, and pauses. "Preventive hassles cost 60 kopecks, and the sewing—90."

"But you take the trouble to look at the price list and there in black and white you will see that it is possible!"

"Lenochka, but if you not only look but also take the trouble to think? After all, this is clearly absurd."

Zhanna giggles and turns away.

"You know that it is not for you to decide what is absurd and what is not! Your duty is to follow orders. Write this down!" Yelena Nikolayevna gives a strong order to Zhanna. "An overcharge of 90 kopecks."

Zhanna buries her head in the paper.

"Now, tell us why you charge twice as much as is indicated in the price list for narrowing a boot top."

"Because we do this twice as well as is envisioned by this undistinguished document."

Zhanna puts her hand over her mouth and Sergey wonders what lies behind her laughter.

"Be serious!" Yelena Nikolayevna demands.

"I am being serious!" Sergey responds. "Let us open up the price list and the description of the jobs. For 2 rubles, 60 kopecks we are supposed to: rip out the backing, sew the back seam of the shoe, put the backing in place, and give the client a shoe that will look like this price list."

"What? What?"

"But the fact is, Lenchka, that it is necessary to sew it in the way the foot requires. Along the back seam and along the groove or along the back seam and along the front seam. Double work—double pay."

"Do not try to pull the wool over my eyes! I participated directly in drawing up this price list and I am well aware...."

"You?!" Sergey shouts. "We ought to get you! Be so kind as to tell us if you have any idea about what goes on in shoemaking?"

Dampness appears over Yelena Nikolayevna's bright protruding mouth.

"That is none of your business!"

"No, my dear, we are the ones whose business it is! Oh, it is so much our business! Without knowing a thing about our work, you figure out the price for it...."

"Do not try to irritate me! The prices are scientifically substantiated and it was not I alone but a large collective that set them!"

"And has any one of your large collective tried to put a patch on a slipper? Out of what considerations did you evaluate this at 15 kopecks? For heels you have 80 kopecks, and for a patch—15, but did you ever ask a shoemaker which takes more time? Did you ever think of the leapfrog process that begins with your prices?! Go through the shops and try to put on a patch or a heel on

a shoe without waiting line? They will tell you anything but they will not accept it. For the person who takes it will have to pay out of his own pocket...."

"There, exactly!" Yelena Nikolayevna shouts like Sergey. "It is exactly signals like this that brought us here today! People write: service—5 rubles, fast service—15, to put on a heel—3 rubles! 3 rubles instead of 40 kopecks!"

"And you have become good at straightening out shoemakers?! And you never look at your own defects—you do not have enough conscience?"

"We? We are called upon to protect the workers from your arbitrary actions!"

Sergey shakes his head and smiles sadly:

"My dear naive girl! Where and when did do-nothings like you decide to protect one worker from another?"

"That is going too far! I have been working since I was 17 and I despise do-nothings, do you understand?!"

"Lenochka, if I had never worked anywhere and said to you that I was occupied inventing the eternal engine? What would you call me—would you not call me a do-nothing? To create a price list for repairing footwear that is fair and does not impede the work of the shoemaker or the life of the client is just as impossible as creating the eternal engine. There are no two patches that are the same. What has been torn off and how—can you really see that from the capital? And, moreover, can you dictate how to repair this? All this can be seen only by the person who is doing the work. Do you understand?"

"There you have it," Yelena Nikolayevna breaks in. "I am a small person, I work where I work, I fulfill the assignments in the way they require of me, and therefore you are complaining to the wrong person."

"We are small people too. And it depends on you whether or not our lives will be poisoned with revenge for your bungling or not."

Yelena Nikolayevna, fatigued, falls onto the divan.

"Listen, Serezha, people usually toady to us, but you argue. You probably have connections somewhere very high up?"

"I am tired of toadying to you, Lenchka. And you are more guilty than we are. We are not perfect either, but you are more guilty."

"Serezha, that's enough!"

"Enough?" Sergey catches her mood. "Then gather your papers together and go to the hotel. We will send for you by 7, a comrade and I. We will show you a good evening."

"And the document?"

"Real documents are written after toasts."

Whirlwind of colored lights circle in the semidark restaurant. A mass of dancers are gyrating. Zhanna and Dmitriy, sitting at the table, look at their friends. Irony can be seen in Sergey's face and movements. But Yelena Nikolayevna is enjoying the dance—despairingly, with the single-mindedness of a lonely young girl; as though setting Sergey on fire she touches him with her breast, her luscious shoulder, her thighs.

"Shall we have another round?" Sergey asks at the table.

"Yes!" Yelena Nikolayevna agrees, resting happily, and all ablaze, she presses herself to him and whispers something in his ear.

"Eh, baby," answers Sergey loudly. "You want to take me with your body as well!..."

She reels back. For a long couple of seconds her face goes gray. She says:

"And if that is so: can I settle accounts with you?"

"If that is so—do not make a fuss, I forgive you."

Sergey works the pedals and the car with screeching tires jerks onto the road and takes them away.

"Why did you treat her that way?" Dmitriy asks.

"Well—for no reason?"

"They sent her here and she did her inspection. If they did not inspect us, we...."

"We, we! But what about the fact that they have already gotten used to calling us thieves? If they search you, that is normal, if they milk you for money, that is the way it is supposed to be! But where does it end?! Is there an end to this?!"

"But...."

"You be quiet, Dimych, you do not yet know what is what in our life or who gets how much. Just think: if you were to work directly with the client, would you need a receiving clerk, a foreman, a factory office with 50 parasites, a city supply and sales administration, an oblast supply and sales administration, ministries? And inspections—more than you can count on both your hands and your feet—are they necessary? Someone has become frightened that you might earn a kopeck they

had not accounted for and have planted someone to keep track. And will this involve less than this kopeck? More! There are so many people who are making their living from you! So tell me, was it worthwhile to get organized? Was it worthwhile to pervert such a mass of people with this idleness and power?!"

Sergey drives the car into the garage. He does not like this procedure. It is revolting to him to get the keys smelling pungently of metal, to open the gates, to hold them open while going into the cluttered shed, and then slide out, being careful to avoid the spots of oil, and close the gates and then hear the screech of the lock.... Lord, this piece of iron on wheels has so many complaints! What if all the time and trouble (not to mention money!), what if everything expended on the car were to be taken and given to someone? Sasha, for example....

It is pleasant to think about Sasha, but also oppressive. One can give to a person—that is almost mandatory. But yet he can not. If he could....

He gets out another key and the lock had already clicked, melodically, like castanets. Only under Sasha's hand did the lock sound like that.

"You are a little bit late!" Sasha does not reproach him, but is glad.

He does not say anything. This concern drop by drop is disciplining him, making him think about what was awaiting him, and what people think about him.... About him? Everyone in this life thinks about himself. This one turned up to defend the interests of the workers.... And that one?

One leg on top of the other, he kicks off his shoes. In the bathroom, looking at Sasha through the mirror over the sink, he asks:

"Have you finally settled in here?"

That is rude. He becomes tense, suppressing his remorse.

"You.... You shameless swine! And a fool! And if you wish more, let me know!"

She noisily collects herself and goes up to him with a face filled with desire to say something devastating.

"Only more briefly!" Sergey warns.

"More briefly?... There is a stewed rabbit. And I am keeping a potato warm. But you...."

She does not slam the door, she locks it herself with her key in order not to bother him. Painfully listening, he follows her steps down the stairs and through the yard. He pours himself a drink and drinks it greedily. He pours

another and looks at the greenish, bubbly wine as if trying to figure out whether there is enough in his cup to take care of someone who is tired and has drunk plenty during the day. He drinks.

How difficult it is to get up in the mornings! Whether he is sleeping or not—the customary feeling of alarm awakens Sergey with the first daylight: is everything all right in the shop, did they not have another inspection in his absence, did they not leave a burner on on some bench?... And he turns from side to side; sleep is still near, somewhere quite nearby is blissful oblivion, but his heart beats fearfully, and with its beats drives its message to his heavy, hung-over head. At about 10 the bed turns into cobblestone and he sits up.

A report today, he has to make a call to the shop.

"Kolyunya? Is everything quiet there? Have the girls made the plan? Have they finished counting? Good, tell Rita that I am waiting for her at the factory."

Locking his car at the front entrance, he is transformed. What he brings to the surface is the image of a person who has an abundance of luck, is moderately reckless, makes money easily and spends it just as easily.

"Yekaterina Petrovna!" he greets the guard. "How is your health? Thank you? I thank you! We are also interested in your health! How are your old comrades—they are not thinking about any operations? No need, Yekaterina Petrovna, you know everything before they even think about it!"

Yekaterina looks modest, and it is only the lively quickness in her eyes that give away her appetites.

"Slavik is bringing me a package, do not hold him up." With the experience of a pickpocket Sergey sticks 3 rubles into the open pocket in Yekaterina Petrovna's jacket.

The quickness in her eyes flares up like the green signal of a traffic light.

"Greetings! Good people!" Sergey pushes his way through to Aunt Shura, who is in charge of the receipt books—he turns them in and gets the binders back, taking into account a sum that is acceptable for these books in the shops.

"Do not let him to the head of the line."

"Colleagues, I—here," Sergey raises his hands. "Nothing. Aunt Shura! Has Rita already checked these? Well, then, to the line. But you make a fuss! Aunt Shurochka, here are the numbers, for some reason I can't find these books. Shall we have a look later? Please! And I will drop in after dinner. Oh, and your granddaughter is with you! Are you not bothering your grandmother?"

"No"—the clear eyes grow dim.

"Do not bother her, Grandmother has responsible work!"

"But I am a smart girl, Uncle Serezha, and I help my grandmother!"

Aunt Shura has a bright, open gaze, her clean gray hair is neatly pulled back and tied in a bun, and held with a comb.

"I shall take a look, Serezha, do not worry," she says with a softness that is permissible only to old teachers.

There is one more piece of business taken care of. Sergey "takes" the money accepted according to the books. Aunt Shura, from her own supplies, from that which has reached her from the printing office through the supply workers without being accounted for, selects books whose receipt numbers correspond to the "lost" ones and turns the whole bunch over for the signature of the director and head bookkeeper, and for each of these she receives 10 rubles from Sergey. And Sergey has 300-350 left. Very simple. There was just one thing: it is necessary to subtract the missing sums from the earnings of the masters. Sergey tries not to think of that—it makes him squeamish. By virtue of his position luxury means to be squeamish! This is an ordinary, almost innocent pretense in their lives. And the friendship with Aunt Shura is nourished, and this is also capital.

So what is it like for him today? It is part of the plan to give chocolates to the girls and to Rita in the bookkeeping office, because everything is decided there. But she has one report and he has another. In order not to forget anyone he goes along down the corridor from office to office. The first plaque says: "Factory Committee."

"Annushka!" Sergey beams. In response to him beams the dark-complexioned, bright smooth face of Comrade Prikhodko—Annushka, chairman of the factory committee.

"My dear!" Sergey continues politely and on the desk, like a letter in the mailbox, he drops 50 brand-new ruble notes.

"Sere-zha!" she says objecting, confused, noble.

"I am here on business"—it is not pleasant to talk about how much has been given or for what. "Here is our spittoon for complaints, I have brought it for your signature. And the rush copy, you see, is completed!... Universal literacy and then, you know, crowds of lunatics are wandering freely about the city! No, it is true, that is what they write—a final diagnosis!"

From the chairman's safe appears a new complaint book with seals and signatures.... Sergey has this in reserve so that an unhappy client might have somewhere to pour out his soul. Annushka is sincerely disturbed.

"What should we do with the complaints? We must fight against this. Finally, we must get after those people who are causing them!"

"Annie, they hired one fool with wages plus additional payments to fight against the complaints. So he is fighting against them but thinking to himself: but what will they do with me if I get rid of all these complaints?"

Annushka blinks, concentrating very hard, and then smiles and waves her rosy hand:

"Well, you, you are not serious!"

There is also the receiving room. You cannot deceive Sasha. One should not remember what happened yesterday and make excuses. It is better this way:

"Sash, I was just leaving the house and I saw a bunny. It said, take this to Sashenka. And it gave me this package of chewing gum."

"Fool!" Sasha is happy. "Old, and—a fool!"

"Let us get the report out of the way and then I will steal you away."

"Work...."

"I will steal you," says Sergey. Louder than he should have: Vera Pavlovna, the head engineer, looks out of her office.

"Serezha, come in here!" she says severely and then pierces Sasha with a glance as if she were poking a pin through a butterfly.

"Vera Pavlovna," Sergey hurries across the threshold. "Just so I do not forget, I have two questions. The first...."

He pushes across her desk a flat envelope with only two papers but they are worth a hundred. Without stopping, the envelope slips into the drawer.

"Thank you."

And the second. I have heard that we are going to get some new typewriters...."

"Let us assume," Vera Pavlovna says playfully:

"I would like one...and a typist for it, a girl...."

"I will show you a girl! And not the kind you are used to!"

"Verochka Pavlovna, we have a separate account for a typist. We need one."

"We shall see. I think we will be able to find one. But that must be done properly through channels. How was your inspection?"

"Everything is in order. Do you want the certificate?"

"Let me see it. So, so, oh, you, my goodness, what efficiency! Did it cost a lot?"

"A table for four and an entire evening of charm. Not so expensive as repulsive."

"What are you going to do. You can take consolation in the fact that inspections are done for us, to help us."

"Verochka Pavlovna, it would be better if you were to say that at today's meeting—all right?"

Vera Pavlovna's mustache bent upward.

"Serezha, who would give us 60 percent if it were not for the inspections? When the higher-ups see our situation they understand that if they do not offend us we will not forget them. And that is repulsive to you? That is plain ingratitude."

"I give up!" Sergey throws up his hands. "As always, you are right, Verochka Pavlovna. But still, it is repulsive."

"I do not like you anymore!" Vera Pavlovna drops the corners of her mouth and her heavy cheeks fall even lower. She has a small head but a large face, because of these cheeks and her double chin. It is solid and heavy, like a dumbbell.

"You do not. Is it also repulsive to change over to 60 percent?"

Sergey feels a burning in his cheekbones. Upset with himself because he is blushing like a schoolboy, he says through his teeth:

"And am I less responsible than the others?"

"No. My relationship with Ivan Mefodiyevich does not depend on how much either. You know that."

"Yes, I know!..."

"But you spoil workers for us. Throughout the city it is 60 and you take 50. Why is this?"

The telephone begins to jingle.

"Yes!" Vera Pavlovna says in a bass and nasal voice. "Who? Hello!" Her voice suddenly becomes more precise and mischievous. "Of course! I would be glad to! I have already ordered it. Yes, yes! And you! I am always glad! Good-bye! Do not forget us!"

And she squeamishly drops the receiver.

"Pedant! I sent him to you. Do whatever you need to, do not take money, let him hang himself!"

Ivan Mefodiyevich accepts the "reports" gloomily.

"Thank you!" he growls out from under his long nose that follows a straight line down from his forehead. His thick hair will not lie down and keeps standing on end. It was a dark lead gray color like a wolf's fur. "Why is Vera complaining about you?..." As though with his fangs, from below, out from under his forehead, he snatches out at Sergey with his steel gray eyes.

Sergey shudders and feels a shaky weakness throughout his body, and he feels small and powerless.

"We will correct it, Ivan Mefodiyevich!"

"Correct it."

(Continuation follows)

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CEMA Countries Economize on Fuel, Energy
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[Article by V. A. Safronov, assistant chairman of the USSR Gosplan, and O. I. Tarnovskiy, doctor of economic sciences, "Institute of Economics of the World Socialist System of the USSR Academy of Sciences (Moscow): "Incentive for Economizing on Fuel and Energy: Experience of European CEMA Countries"

[Text] The impetus to engage in a struggle for economizing on fuel and energy resources in the European CEMA countries was the increase in world prices for them at the beginning of the 1970's. Wholesale prices for liquid fuel and coal and the rates for electric energy during that period were increased, taking the higher world prices into account (and sometimes even to a higher level), and they remained stable over a number of years. In the next stage, in the second half of the 1970's, directive planning was placed in the foreground in the struggle for economizing on fuel and raw material, above all special programs for economy.

At the beginning of the 1980's the European CEMA countries entered a new stage in the struggle for economizing on energy resources which was typified by a comprehensive approach to the utilization of the economic mechanism. Programs for economizing on energy barriers are now used as a basis for improving normatives for the expenditure of material resources in industry, agriculture, construction, and transportation. Not only wholesale prices, but also credit and financial levers are increasingly being directed toward economizing on fuel and energy. In the majority of European CEMA countries special state organizations have been created for guiding the work for economizing on energy—commissions and bureaus whose plan of activity is established by the governments.

During the second half of the 1970's Hungary developed the Program for Economizing on Energy During 1981-1985. In keeping with it, 15 million forints are allotted for financing projects directed toward reducing production energy expenditures. Through this 6.4 million forints were allotted to enterprises as state subsidies and 8.6 million forints were bank credit and the internal resources of the enterprises. Since 1980 every enterprise in Hungary has been obligated to include measures for economizing on energy in the plan for long-range development; the fulfillment of this point of the plan is taken into account when evaluating the economic activity of the enterprise.

The peculiarity of the Energy Program in effect in the GDR is its all-encompassing nature: All questions of efficient utilization of fuel and energy are resolved in an interconnected way at the state level. The program envisions not only a limit on the annual increase in consumption of fuel and energy resources (no more than 1 percent with an increase in the national income of 5 percent), but also concrete factors in economizing: extensive application of energy-saving technologies and equipment, comprehensive processing of petroleum and solid fuel, and improvement of the structure of the national economy as a whole.

The Directive Program for Research and Development in the Area of Energy for the Period of 1981-1990 and the Basic Directions Up to the Year 2000 was adopted in Romania in 1979. In keeping with this Program, during the first 10 years it is intended to reduce the energy-intensiveness of the gross industrial output by 40 percent, and by the year 2000—by a factor of 2.5 as compared to the 1980 level. It is intended to make extensive use of factors that provide for reducing the proportional energy-intensiveness of items of Romanian industry.

In Czechoslovakia, in keeping with the assignments of the 7th Five-Year Plan and the complex of measures for improving the system of planned national economic management, state target programs have been developed and adopted for more efficient consumption of fuel and

energy. In keeping with these programs, during 1981-1985 in industry, agriculture and transportation there should be a savings on fuel and energy resources in an amount of 13.5 million tons of conventional fuel.

The European CEMA countries regularly revised the state norms for the expenditure of fuel and energy, which makes it possible to constantly strengthen their technical and economic substantiation. On the basis of this they establish stricter consumption limits in which they determine the permissible volumes of energy expenditures.

In the GDR the normatives for the expenditure of fuel and energy (like those for raw and processed materials) are established for the enterprises each year. For all enterprises they have introduced monthly reports concerning the utilization of fuel and energy within the framework of the established norms. In the event that it actually exceeds the limits, in principle the enterprise has the right to obtain additional funds of energy bearers for 10-15 days of operation, but the procedure for obtaining them is especially difficult. The enterprise must submit all the documentation that proves the existence of objective causes for the overexpenditure of fuel and energy and also the plans for future economizing on resources in order to make up for the overexpenditure. This practice, which relies on a certain reserve of energy resources created within the framework of branch ministries and put to use only when there are real commitments for prompt reimbursement by the enterprise for the additional energy bearers, could undoubtedly be extremely useful for the USSR national economy.

In Poland the enterprises plan their own measures for economizing on energy resources and develop the corresponding norms. Because of the critical shortage of the majority of kinds of raw materials, fuel and energy the Sejm draws up within the framework of the annual national economic plan material balances for the production and distribution of the most important kinds of fuel and energy resources and normatives for expenditures. For each enterprise it establishes annual and quarterly or monthly limits for their consumption. Quarterly limits are established for electric energy and monthly ones for gas.

In Czechoslovakia the balances and normatives for the consumption of the most important kinds of fuel and energy (as well as raw and processed materials) are established as mandatory indicators of the state plan. They also established limits for their consumption in the branches of the national economy, normatives and limits of reserves, and import limits (in terms of volume and individual items). With the help of the normatives pressure is exerted on the organizations consuming fuel and energy to reduce their expenditures. Since 1981 they have been taking into account the degree of utilization of the aforementioned resources when making the current

evaluation of the fulfillment of the plan as well as for awarding bonuses to management workers, engineering and technical personnel, and rank-and-file workers for the results of the year.

The regulation of the temperature norms for heating premises for various purposes exerts a positive effect on the economizing on fuel and energy. Lower but completely adequate norms have been established, which made it possible to significantly reduce direct losses of energy resources.

Thus in the GDR the temperature limit for warehouse premises has been reduced to +10-12 degrees C, for production premises for manual labor is performed by a worker while sitting—to +18-20 degrees C, where work is performed while standing—to +12-16 degrees C, trade premises (with the exception of warehouse premises)—to +18 degrees C, for service premises, schools, cafes, clubs and entertainment enterprises—to +19-20 degrees C and for residential premises—to +19-21 degrees C. It has been calculated that reducing excessively high temperatures in premises by 1 degree produces a savings on fuel in an amount of 5 percent. On the scale of the country this means a savings of 1 million tons of fuel oil or 5 million tons of brown coal (that is, a week's extraction of coal in the country). The temperature of hot water in residential buildings has been reduced to 45 degrees centigrade in keeping with the norms (in the USSR it is +60 degrees C). Hot water to residential and public buildings is cut off during the night hours.

In Hungary the temperature in work premises, according to the limit, should not exceed +20 degrees C, and in the corridors—to +16 degrees C; and norms for expenditure of energy have been established on the basis of this.

In Romania the temperature of the air in residential and service premises during the heating season should not be higher than +18 degrees C and in shops and other industrial buildings—to +16 degrees C. Maximum norms of fuel consumption have been developed for heating them and providing hot water, the productivity of existing heating installations is stipulated, and the climate zones in which the buildings are located are taken into account. The national councils and housing councils provide for a dependency between the work of the heating systems of residential buildings and apartments on the temperature of the outside air and they check on the observance of the norms for the expenditure of fuel.

In the European CEMA countries, special attention is devoted to directive-planned measures directed toward economizing on petroleum fuel. To a significant degree this is achieved by introducing mandatory normatives. The normatives introduced in agriculture for the consumption of fuel are differentiated depending on the zone, quality of the soil, peculiarities of the production specialization, and climatic conditions.

In the GDR, for example, the territory is divided into four agricultural zones and for each of them they have developed normatives for the expenditure of fuel for all kinds of work in crop growing, animal husbandry, transportation and for stationary installations. The catalogue of normatives is refined each year. A broader differentiation of the normatives for the expenditures of petroleum fuel taking into account the areas of consumption could contribute to economizing on liquid fuel in USSR agriculture.

Attention should also be given to administrative measures: the reduction of the limit on the release of petroleum products to the population, the reduction of the fleet of service vehicles, strict limits on gasoline for automobiles, and speed limits. In Bulgaria, for example, in 1979 limits for release of fuel oil to the population and public organizations for heating premises were reduced by 20 percent and the norms for release of hot water were reduced by 10 percent. In recent years they have begun to abolish the bus routes with little traffic (while expanding the trolley routes), certain airlines are being cut back, and if they are not profitable they are eliminated altogether. Administrative measures are used to withdraw from operation old motor vehicles whose engines consume too much fuel. Moreover, they limit the territory on which the passenger and cargo vehicles of one automotive base or another can operate. Without written permission from the higher organization not a single enterprise has the right to send a passenger vehicle belonging to it outside the district where it is registered. Although there is no such limitation for cargo vehicles, there are limits of operational distance for them. Vehicles with trailers can go only up to 80 kilometers from the border of their district of registration and without trailers—up to 50 kilometers. Moreover, they can go beyond the borders of their district only if their cargo is no less than 1.5 tons.

In Hungary during 1972-1980 the fleet of departmental passenger cars decreased by 46 percent. The number of people with the right to compensation for expenditures when using private vehicles for official purposes was reduced. Now the annual savings in the country amounts to approximately 300 million forints.

In the GDR in recent years they have stepped up control over the operation of motor vehicles and the fuel consumed by them. Low speed limits have been introduced: for passenger cars—up to 80 kilometers per hour, buses—up to 60 kilometers per hour, trucks—up to 60-80 kilometers per hour, and transportation of cargo over a distance of more than 50 kilometers must be carried out on the railroad.

In Romania in the middle of 1979 the automotive fleet of all departments in the taxi service were reduced by 50 percent. At the same time the limits on gasoline were reduced for departmental transportation, and the speed limit was reduced to 70-90 kilometers per hour. Departmental transportation was permitted to go beyond the

districts where they were registered by a distance of no more than 10 kilometers. Rates were increased for taxis and cargo shipments. Only half of the private automobiles were allowed on the streets of the country on days off. Only vehicles with even numbers on their license plates were allowed on the roads on one Saturday, and those with odd numbers on the next Saturday.

Provision of Material Interest

Most frequently material incentives are used to strengthen the impact of normatives on the sphere of consumption of energy resources, to implement resource-saving measures, and to encourage work for improving the structure of consumption of fuel and energy. Incentives are established both through the economic incentive fund and directly through the wage fund. As a rule, in the CEMA countries the financial basis for the remuneration is strengthened through savings on material resources. Thus in the GDR in 1983 deductions into the fund for social measures and efficiency work from above-plan net profit obtained as a result of economizing on energy resources as compared to the established norms were increased from 40 to 50 percent; and for economizing on raw and processed materials—from 15 percent to 50 percent. The fulfillment of a higher counterplan is encouraged with the same amounts as for economizing on resources as compared to the normative. In Bulgaria as of 1 July 1983 50 percent of the savings on energy (as well as raw and processed materials) in excess of the state planned normatives is deposited into the overall income of the enterprise, the majority of which goes into the wage fund.

In Romania, 50 percent of the savings on fuel and energy resources (and 30 percent of the value of the raw material that is saved) is deposited into the wage fund; from it they take money for bonuses for workers who have distinguished themselves in this area. In Czechoslovakia in 1983 it was established that the amount of the wage fund is increased by the entire sum of savings achieved on fuel and energy as compared to the annual limits. The sum of the savings is calculated on the whole for the production-economic unit (association) for the calendar year.

In all of the European CEMA countries the struggle for economizing on fuel and energy is economically encouraged by the payment of bonuses to workers who provide for an actual reduction of the volume of utilized resources as compared to the established norms. The bonuses are paid both from the economic incentive funds and from the wage funds in cases when the formation of the latter is linked to savings on energy resources.

As early as the 1970's the GDR introduced material incentives for above-plan savings on fuel in industry and transportation. The remuneration is established depending on the amount of the savings of fuel (and raw

material) for 12 months. The amount of the material incentives is stipulated in the collective agreement of the enterprise, and if it does not exceed 10,000 marks it is not necessary to pay taxes or payments for mandatory social security. There is a 20 percent income tax on remuneration in excess of the aforementioned sum.

A unique bonus for efficiency in the expenditure of fuel in automotive transportation is envisioned in Hungary. Several years ago they introduced a system of cash accounting for fuel. Instead of coupons the drivers receive the sum necessary for acquiring fuel for a given distance. They themselves purchase the fuel at gasoline stations, trying to save money for themselves. There is only one way for them to do this—to arrange their route intelligently and drive their vehicle in such a way as to save as much gasoline or diesel fuel as possible. The new system of accounting for fuel produces a significant savings. There are now no objections to the rigid norms for the expenditure per kilometer. For the best drivers of Hungarian automotive industries this kind of monetary bonus amounts to 15-20 percent of their previous monthly earnings.

The Hungarian experience is of a certain practical interest for our automotive enterprises as well, where questions of incentives for a thrifty attitude towards fuel are as crucial as ever. Issuing drivers money for gasoline can produce the highest positive result in savings but only with unification of prices for fuel that is distributed through the AZS (the prices are the same in Hungary). At the present time, as we know, in the USSR different prices are in effect for gasoline for means of transportation in the state sector and for private automobiles. Equalizing the two price levels would eliminate, for example, the economic advantage of carrying out uncontrolled commercial "gasoline operations" with private owners which entail, among other things, the possibility of a wasteful attitude on the part of drivers of state vehicles toward the fuel they purchase at AZS's.

Financial and Credit Benefits

It is possible to stimulate savings on energy resources along the line of the financial system through the policy of capital investments and the granting of tax breaks and priority credit for measures for economizing on energy. Thus Hungary is implementing a policy for strict limitation of nonreimbursable financing of capital investments from the state budget, but in certain cases exceptions are made to this rule. They include, for example, state budget financing of capital investments in order to economize on energy and also investments in the mining industry for the development of coal mines and other deposits.

In Poland enterprises that use part of their profit for modernizing equipment and technological processes for purposes of economizing on energy, fuel, and raw material are given a break on the income tax paid from profit into the budget. It is possible to claim these benefits if

three mandatory conditions are met. First, if the reduction of the consumption of fuel and energy (and raw material) per unit of output achieved as a result of the modernization has not led to a deterioration of the quality of the products that are produced. Second, if mandatory technical norms for the consumption of energy resources per unit of output are observed before and after the modernization. Third, if it is possible to determine qualitatively the unit and overall reduction of the consumption of fuel and energy. The overall savings for the enterprise in Poland are determined as the sum of the actual proportional reduction of consumption in terms of comparable annual volumes of output. The actual savings are calculated once a year on the basis of the annual balance of the enterprise. The amount of the tax break depends on the amount of the proportional reduction of consumption of energy resources achieved and the overall actual savings according to comparable annual volumes of production. The income tax break is granted by agencies of the Ministry of Finance on petition from the enterprises. This practice could make a significant contribution to economizing on resources at enterprises of the USSR as well.

A number of countries are extensively utilizing the stimulating function of bank credit. In Hungary, for example, credit is granted primarily for measures that provide for economizing on fuel, energy and raw material and also those that expand the production of goods for export. Credit is granted under competitive conditions which envision either recouping the expenditures through economizing on energy and fuel within a certain period of time or replacement of the consumption of one kind of energy bearer with others, and so forth. The competitive conditions can change, depending on the demand for credit.

The GDR has expanded the granting of credit under beneficial conditions for enterprises that modernize equipment for purposes of reducing the expenditure of energy, fuel, and materials. For this credit the bank charges 1.8 percent (for ordinary credit it is 5 percent). Since 1982 the enterprises have been able to obtain credit under privileged conditions for bringing secondary resources into production as well. In order to strengthen payment discipline, 18 percent annually is charged for failure to make payments. According to data of GDR economists, expenditures on economizing are one-third less than for extraction and transportation of an equivalent quantity of fuel.

Fines for Wastefulness

An extremely effective measure for economizing on fuel and energy in the European CEMA countries is the imposition of fines on those enterprises that have allowed an overexpenditure of energy bearers as compared to the established limits. Since the fines are paid from profit, they directly affect the volume of the economic incentive funds of economic organizations and the possibilities of material incentives for workers.

In Hungary the fines are applied for negligent utilization of energy bearers, for example, for heating premises so that they are warmer than the established temperature conditions. They can be imposed on enterprises, cooperatives, and also local soviets and other institutions that receive subsidies from the state budget. The fines can also be imposed if, in spite of the state subsidies granted within the framework of the program for efficient utilization of energy, measures are taken too late or they do not achieve the earmarked results.

Fines are also imposed in the event of inefficient utilization of fuel because of running motor vehicles that are not loaded. Since 1 January 1981 in Hungary government instructions have been in effect according to which cargo truck with a capacity of more than 5 tons that has traveled empty for more than 100 kilometers the enterprise must pay a fine in the amount of 3 forints for each kilometer of travel. Moreover, the enterprise must keep track voluntarily and if the payment is not made the automotive inspection team forces it to pay the fine only 10 times the amount. This policy makes the enterprises look carefully for more efficient shipment routes. The incentive is even more effective since the payment of the fine reduces the profit and is not reflected in the production cost.

In the GDR for overexpenditure of fuel and energy a fine that is 10 times the amount of the overexpenditure is exacted from industrial and agricultural enterprises. There is a corresponding reduction of the volume of the wage fund. Romania also applies fines for overexpenditure of energy resources as compared to the normatives. The fines are differentiated for certain energy bearers from 2 to 10 times the amount of overexpenditure.

Fines for overexpenditure of fuel and energy in Czechoslovakia are from 3 to 5 times the amount and are exacted in the form of additional deductions from profit into the budget. In individual cases the fines also reduced the wage fund. The experience in differentiating fines for exceeding the limits of consumption of energy resources by rank-and-file consumers and large enterprises, where large amounts of production sometimes predetermine large amounts of losses, is of interest and largely useful for the USSR. In order to put a stop to these losses, increased sanctions have been established for large enterprises in Czechoslovakia. Thus for overexpenditure of electric energy for the average consumer the fine has been established in the amount of 2 krone per kilowatt hour, and for large consumers that have limits on the expenditure of energy in 15-minute intervals—in the amount of 300 krone. When the average consumers overexpend heating gas they pay a fine in the amount of 10 percent of the cost of the overexpenditure, but large consumers, depending on the causes that led to the overexpenditure, pay from 5 to 20 times the cost for each cubic meter.

The Role of Prices

The European CEMA countries use wholesale prices to stimulate the processes on which further streamlining at

the structure of consumption of energy resources depends. Their level is brought in line with socially necessary labor expenditures, and the ratios between prices for individual kinds of fuel are formed in such a way as to stimulate as much as possible the replacement of energy bearers that are in short supply with others that are more available.

In all of the aforementioned countries the overall level of wholesale prices for energy bearers was sharply increased as early as the 1970's. And now too they are measured according to the movement of real expenditures on the production of fuel and energy. A rise in the price level exerts a generally positive influence on the savings on energy bearers. It is important that wholesale prices for individual kinds of them are differentiated, taking into account further streamlining of the sphere of consumption. Thus in Hungary from 1976 through 1981 the domestic wholesale prices for petroleum products in short supply increased by a factor of 2.5, and prices for solid fuel, of which there is a greater supply, increased by only 33.6 percent. In Romania rates for the utilization of gas and electric and thermal energy have doubled while at the same time the norms for their consumption have decreased by 20 percent. The rate for gas and thermal energy increased by a factor of 2.8, and for electricity—18 percent.

In Czechoslovakia during 1981-1982 there was a one-time change in wholesale prices for various kinds of fuel and energy resources, the purpose of which was to bring wholesale prices closer to socially necessary expenditures. In 1981 the prices for solid fuel exceeded the 1978 level by 34 percent, heating gas—49.8 percent, and electric and thermal energy—24 percent. In 1982-1985 the wholesale prices for all kinds of fuel and energy were increased by another 8 percent. Additionally, in Czechoslovakia (as in the GDR) a decision was made to annually increase prices for energy bearers—coal, coke, gas and petroleum—by 2 percent. But the consumer enterprises were forbidden to plan an increase in expenditures because of this increase in the cost of fuel. They must make up for it through measures for economizing on energy.

This kind of moderate price increase for energy bearers whose extraction predictably becomes more expensive as the more productive deposits are exhausted in the centers of the extraction industry move to the east could contribute to economizing on fuel and energy in industrial enterprises of the USSR as well. The management of the enterprises, beforehand, before the next planning periods, would have the opportunity to develop concrete measures directed toward amortization of the earmarked price increases for fuel and energy through economizing on other items of the production cost.

Today in a number of countries (Hungary, Poland, Bulgaria) domestic wholesale prices for energy bearers and the basic materials are set at the level of the actual prices for their acquisition on the world market. Thus

wholesale and retail prices for automotive gasoline during the past years have increased severalfold here and on the average are more than twice what the retail prices for this kind of fuel are in the USSR.

In Bulgaria wholesale prices for energy bearers, like for the basic raw material, are established at the level of the highest world prices, which significantly exceed the contract prices of the world socialist market. Bulgarian economists think that this principle of price setting, on the one hand, stimulates savings and thriftiness and, on the other, provides for stability of domestic wholesale prices even if contract prices change each year.

The Organizational Structure of Management

As a rule, special commissions and bureaus are in charge of the struggle for economizing on fuel and energy. In the GDR, for example, where questions of economizing on energy resources are regarded as a primary state task, since 1979 the Central Energy Commission has been functioning with the minister of the material economy at its head. The commission's work plan is approved by the council of ministers.

The commission considers the energy aspects of the plans for buildings, structures, designs of machines and mechanisms, and technological processes. If their energy-intensiveness exceeds the best world models, they are rejected. Additionally, the commission determines the kind of energy for new enterprises and makes decisions concerning the imposition of fines for overexpenditure. The commission participates directly in the adoption of measures for moral and material incentives that achieve great savings. They are given the title of exemplary energy management and are awarded a one-time bonus. These combines, enterprises, communes and cities are entered into the Book of Honors. After 3 years they must confirm this title.

In Hungary measures for economizing on fuel and energy are directed by the Energy Bureau under the minister of industry. It is responsible for comprehensive tasks for revealing sections of the national economy where it is possible and necessary to replace liquid fuel with solid fuel, to develop technologies for applying kinds of fuel that are in sufficient supply, and to install and adjust equipment. The energy bureau acts both as a scientific research and planning-design organization and as an introduction firm. Its work is arranged as follows.

Initially, they formulate a portfolio of orders from the applications of the enterprises. Then the local workers verify the substantiation of the applications for changing the structure of fuel resources, make adjustments and finally determine the scale of the restructuring. After expert evaluation the order which is coordinated with the client is accepted for execution.

Upon presentation to the bureau, the Hungarian central planning agencies refine the orders for liquid fuel which are drawn up each year by the enterprises. Here they take into account proposals concerning the replacement of petroleum products with more economical kinds of fuel, for example, secondary energy resources. As a result, the supply of liquid fuel is reduced or even completely eliminated for the enterprise at the end of a period sufficient for rearranging the structure of its fuel balance.

The bureau has the right to independently raise the question of replacing liquid fuel at enterprises that hold back on making applications. Its representatives are obligated to substantiate their conclusion in all ways, to respond to possible objections from the management of the enterprises, and to show the economic advantages of changing over to the utilization of the kinds of fuel that are in sufficient supply. The enterprise is placed in conditions whereby it itself is economically interested in applying for the services of the bureau.

The introductory function of the energy bureau is especially truly manifested in the stage of implementation of plans for replacing petroleum fuel. The corresponding equipment is manufactured under contract with machine-building enterprises and the subject of the agreement is the bureau and not the client enterprise. It has the right to select the manufacturer. A competition is conducted for this and the winner is the enterprise that offers the best conditions—short time periods for manufacture, high quality, and the lowest price. During the time of the fulfillment of the contract, there is author's supervision and the necessary assistance is rendered.

If necessary, the installation and release of the equipment are done not by the manufacturing enterprise but by a special installation organization with which the bureau has also included a contract. Paying for the object out of its own funds the client enterprise receives it under "turnkey" conditions. For accounts it uses both its own and borrowed funds, mainly in the form of long-term bank loans. In Hungary these are used for approximately 60 percent of the measures connected with economizing on fuel and energy resources.

In Romania a large positive role in economizing on electric energy in production is played by energy commissions that exist at many enterprises. Created with the enlistment of specialists and advanced workers, these commissions have already achieved considerable results. At a bearing plant in the city of Aleksandriya—one of the largest centers of Romanian machine building—on the initiative of the energy commission, a system of measures was developed: shop dispatcher control of the normative expenditure of electricity, new schedules for the operation of individual energy-intensive equipment, efficient intraplant lighting, and more economical conditions for the consumption of energy during recesses. As a result, each year the plant saves about 300,000 kilowatt hours of electric energy without detriment to the fulfillment of the planned assignments.

The economic mechanism in effect in the European CEMA countries, as a rule, exerts a generally positive influence on reducing the consumption of fuel and energy by the national economy. During 1980-1983 the volume of consumption of energy bearers in the GDR decreased from 121.8 million tons of conventional fuel to 121.7 million, in Hungary—from 40.5 to 39.8, in Czechoslovakia, from 97.4 to 96.9, and in Poland—from 176.7 to 161.4 million tons of conventional fuel (in the last case a certain role was played by the crisis phenomena in the economy brought about by the actions of antisocialist forces). In a number of CEMA countries during the aforementioned period there was a certain increase in the volume of consumption of fuel and energy, which shows the need for further improvement of national economic mechanisms. Mainly for this reason the consumption of energy resources in Bulgaria increased from 47.3 million tons of conventional fuel to 50.2 million, Romania—from 100 to 101.4 million, and in the USSR—from 1,473 to 1,611 million tons of conventional fuel. In percentages the most significant increase in the consumption of energy bearers was in the Soviet economy: in Bulgaria—6 percent, Romania—1.4 percent, and the USSR—9 percent.

As we can see, with the exception of Poland (where because of certain circumstances the consumption of energy bearers increased more rapidly than the national income did). All the rest of the CEMA countries had an unwavering tendency toward reducing the energy-intensiveness of the national income. This tendency was most developed in Hungary, the GDR, Romania and Czechoslovakia. In Hungary during 1981-1984 the planned assignment for reducing the consumption of fuel and energy by 2 percent per year was fulfilled, even with a certain amount left over. In the GDR, because of the constant attention paid to questions of improving the qualitative aspects of the economy, as early as 1982 they managed to achieve a reduction of the proportional expenditures of energy resources, and in the next year there was a reduction of their absolute expenditures. The production cost of industrial products decreased by an average of 1.9 percent, and the consumption of energy bearers decreased by approximately the same amount annually. Since during the analyzed period in the GDR as well as in other CEMA countries there was no large increase in wholesale prices, the dynamics of the national income shown in the table reflect fully enough the actual movement of the expenditures for wages and the value of the added product in comparison to the consumption of energy resources.

Dynamics of Consumption of Energy Bearers and Produced National Income in CEMA Countries (in % of 1980 level)

	1981	1982	1983	1984
Bulgaria				
Energy bearers	101	105	106	*
National income	105	109	113	118
Hungary				
Energy bearers	100	101	98	97
National income	103	105	105	108
GDR				
Energy bearers	99	101	100	97
National income	105	108	112	119
Poland				
Energy bearers	89	90	90	*
National income	88	86	91	96
Romania				
Energy bearers	100	99	101	93
National income	102	105	109	117
USSR				
Energy bearers	102	106	109	*
National income	103	107	112	116
Czechoslovakia				
Energy bearers	99.8	97.2	99.4	96
National income	99.9	100	102	105

* No information

In Romania, as a result of a firm course toward comprehensive saving on energy bearers that is typical of the republic, especially in recent years, the expenditures of these in the national economy during 1981-1984 decreased by an average of 7 percent. Against the background of the constant increase of the national income

there was an 18.5 percent reduction of energy expenditures per unit of the national income. In Czechoslovakia the average annual proportional consumption of primary fuel and energy resources decreased by 2.4 percent while the national income annually increased by 1-2 percent.

Among the CEMA countries only Bulgaria and the USSR have a quite clearly manifested unfavorable tendency toward increased consumption of energy bearers. In spite of the measures to put a stop to this, in 1981-1983 the increase in the national income still required a steady increase in the volumes of fuel and energy used in the national economy. Moreover, in Bulgaria, in order to provide for higher growth of the national income it was necessary to have a somewhat smaller increase in the volumes of energy bearers necessary for the economy in the aforementioned years. A simple conclusion follows: the mechanism applied in the USSR for stimulating savings on fuel and energy can be partially improved through adapting the experience of the sister countries.

It would be wrong to overestimate the advantages of the economic mechanism for stimulating savings on energy bearers in the European CEMA countries, not to mention to absolutize it. The energy-intensiveness of their national income is still too high, and the difference from the analogous indicator of the leading capitalist countries during the past 15 years has even increased somewhat. The fact that the reduction of the energy-intensiveness of the national economy in the European CEMA countries was slower during the 1970's than it was in the EEC countries led to a situation where at the end of the decade this indicator in Bulgaria, the GDR, Poland, and Czechoslovakia turned out to be 30-40 percent higher than the average for the FRG, France, England, and Italy, and in Romania it was even higher. Only in Hungary was the energy-intensiveness of the national income at the average level of the Western European countries. Improvement of this indicator in the EEC countries during the first half of the 1980's increased the lead of Hungary, where expenditures of energy bearers per unit of national income are now only 20-25 percent higher than in developed capitalist countries.

The achievement of the level of energy-intensiveness of the national income to be found in Hungary, the GDR and a number of other fraternal socialist countries would nonetheless mean a certain advancement for the USSR along the path to the world indicators. The experience of the European CEMA countries in the area of stimulating savings on fuel and energy would undoubtedly be useful for our country's national economy.

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Birth Rate, Labor Resources Discussed

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[Article by N. D. Tarasenko, doctor of biological sciences, Central Siberia Botanical Garden of the Siberian Branch of the USSR Academy of Sciences (Novosibirsk): "Dangers Which Many Do Not Notice"]

[Text] The discovery of genetic laws that explain the causes for the birth of healthy and sick children have set a number of new problems for mankind. One of them is monitoring the quantity and quality of the reproduction of labor resources. What can today's genetics do about the problem, what should one guard against, and what can one advise?

Forty Percent of the Human Intellect Is Formed Before 3 Years of Age!

In recent years such sciences as genetics, medicine, pedagogy, psychology, sociology and others have come to the conclusion that more than one-third of the intellectual development of the human individual takes place in early childhood, before 3 years of age. It is precisely during these years that the bases are laid for the interrelations of the future citizen with the surrounding world and also the foundations of his character. At this age children ask hundreds of thousands of questions of people around them. Analysis shows that there are no random questions. All of them are important! One should be attentive to these questions and answer them calmly, thoroughly, and in language that can be understood at the given age, never brushing a child off because of his "persistence." Daily communication between mother and child, care for him, gains, teaching him simple work skills, self-service, a thrifty attitude toward toys and things, his first books, the need to share toys with playmates, the ability to listen to a discussion or story, and so forth—all this will contribute to developing the intellect. It is especially important to help a child learn to express his opinion and his conclusions to his contemporaries as well as all those around him.

Women comprise 54 percent of our country's working population today and 59 percent of the specialists with higher and secondary education. In a number of branches of the national economy in the sphere of services, especially public education and public health, women generally prevail. A new term has even appeared in foreign sociological literature: "collectives with a feminine effect."

Everyone knows of the immense concern of the Soviet state for maternity and childhood. Women have not only been given increased leaves for pregnancy and birth, but they have also been granted a year of partially paid leaves to care for the child. The network of children's preschool institutions is growing. Young mothers are usually glad when they acquire a place in the children's day nurseries. But this joy also has its opposite side. The average number of children per one educator is about 25, and his main task is to promptly feed them, give them their exercise, put them down to rest, and change diapers. When does he have time answer those thousands of questions, and especially when they are multiplied by 25? This is why we are so bothered by the separation and isolation of children and their mothers during these first 3 years which are so important for children, parents, and the society as a whole.

Of course, granting a woman a 2-3 year paid vacation to pay for and rear the child would be the optimal solution to the problem. But to do this it would be necessary to significantly increase the productivity of public labor and the effectiveness of production, and to raise the level of automation and mechanization of all processes in all spheres of the national economy. There is no doubt that all this would be recouped a hundredfold; this is also confirmed by the experience of certain socialist countries.

Age of Women Upon Marriage (according to Urlanis, 1967)

Age of Bride, Years	Proportion, in Percentages	
	1910	1960
Up to 20	54.5	26.3
21-25	31.0	40.7
26-30	7.3	11.6
31-40	4.7	10.9
41-50	1.9	4.2
Older than 50	0.6	6.3

Other significant changes will also take place: the age of brides in the country will decrease and this will bring about a reduction of the frequency of births complicated by hereditary diseases and the birth rate will increase. This is very important even today since now in a number of regions of the country the death rate is higher than the birth rate. There will be material conditions for the birth of 3-4 children in each family, which would undoubtedly have an effect on their education. Let us consider this problem in greater detail.

The "Effect of the Single Child"

According to the 1979 census the birth rate in the USSR was lower than the average "peace-time" birth rate and amounted to about 1.5 percent, that is, 15 newborn per thousand residents, and in the RSFSR, the Ukraine and Belorussia this figure was even lower—13. (Footnote 1) For comparison let us note that in the prewar years the birth rate was 3 percent. Today's child receives 100 times more attention from his parents, material goods and toys than his counterpart 40 years ago did. And this does not take place without an effect. It is the conviction of A. S. Makarenko that an excess of parental love in the formation and development of the character of the future citizen is more harmful than a shortage of it.

Makarenko thought that the optimal number of children in a family was 3, and with little differences in their ages (1.5-3.0 years). In such families from the very beginning they form a microcollective in which the moral qualities of the future citizen are established and developed, and there is a development of friendship, comradeship, mutual advantage, competition, concern for one another, and goodness. In such an atmosphere there is no room for individualism and egoism that have come to be

called the "single child effect" in literature. Much attention and energy must be expended by educators and the collective in the place of training and work of citizens who have grown up in a family without sisters and brothers before all the facets of their behavior cease to cause friction, complaints, and censure.

Thus, strange as it may be, a reduction of the birth rate has led to difficulties in education, especially the development of the qualities that are necessary to the citizens of a socialist system.

In addition to our citizen's spiritual image, we are bothered by his physical health. Its condition is influenced by a number of factors. Let us consider a couple of them.

First Birth in Later Years

The age of the mother is very important for our posterity. According to statistical data, the average age of a bride in our country in 1965-1970 was 26 years. (Footnote 2) The skeptical reader will say: "That cannot be! How can she be a bride if she is that old?" Yes, the bride should be younger but you cannot argue with facts. And still: why are our brides "getting older"?

A developed country needs comprehensively trained personnel, and modern education lasts a long time—10 years in school and then one must not rule out 2-3 years of work, and finally an institute where the training takes no less than 5 years. Can one be concerned about a family and children during student years? Frequently this remains a dream. Many girls consider the main thing at this time to be achieving equality with men, economic independence, and material sufficiency—everything that is provided by an education.

There is one more reason for late marriages: in practically every country there are more women than men and frequently it is not possible to get married on time. When she gets married at age 26, a woman does not become a mother until she is 27. This is where the concept of the "first birth in later years" arises.

By this age a woman's cartilages and bones change so much physiologically that the probability of possible complications during birth increase sharply. In such cases the physicians must be better prepared, especially surgeons, in order to assist promptly. The frequency of injury to the child during birth with "first birth in later years" is fairly significant on the average and especially great when the "first birth in later years" comes at age 35-37 and later. For this age category the frequency of injury during birth reaches 70-75 percent. To be sure, there are not many women whose first birth comes at this age. From the latest census we know that only 4 percent of the brides have gotten married after the age of 40. And although few of them give birth to children, the probability of bearing an abnormal child is very great.

As practice shows, the appearance of newborns with Down Syndrome is caused by the age of the woman. If one takes 1,000 mothers 17 years of age the frequency of Down Syndrome in the newborn is extremely small, although it still exists, and we shall give it the value of 1. If one takes the same number of women but ages 35-37, the relative frequency of the birth of a child with Down Syndrome will be greater—11, and the probability of this syndrome for mothers after the age of 45 increases sharply—104. Women over 40 give birth to only 2 percent of the children, but 24.5 percent of the children with Down Syndrome have mothers over 40 years of age. This does not depend on whether the child was the first or the fifth to be born.

The age of the mother also has an effect on the condition of the nervous system of the newborn child. The older the mother, the greater the probability of birth defects in the child. If one takes the frequency of birth defects in children who were born to the youngest mothers as 1 (the age group of 16-20), at the age of the mothers of 31-35 the frequency of these defects increases by a factor of 4.3, and at the age of 41-45—by a factor of 10.

Alcohol and Birth Defects

Approximately one-third of the 4.5 percent of children born with defects have deviations caused not by changes in genes but by the fact that because of various factors (ignorance, low culture, harmful customs, habits and so forth) during the period of pregnancy have no regard for the future child. One cannot forget that during the 9 months of pregnancy, when a child appears and develops out of two sex cells, there are thousands and tens of thousands of chemical reactions, and enzymes are formed. The appearance of alcohol in the mother's organism during this time can lead to harm to the offspring and makes the child an invalid for the rest of his life while the family experiences tragedy instead of joy.

It has been known since ancient times that alcoholic beverages exert a fatal influence on posterity. During the past 2 decades interest in the genetic aspects of alcoholism has increased considerably and this is explained by the fact that the consumption of alcohol in the world is becoming more and more widespread among youth and women. Our society, having recognized the fatal consequences of alcoholism among the population, has taken special measures for sharply reducing the production and consumption of alcoholic beverages.

And so, what must everyone know about the effect of alcohol on the organism and the possible consequences of its consumption for future generations?

In the first place, it has now been firmly established that in the general human population one finds individual differences in the effect of alcohol on the organism: from individuals who are completely incapable of processing alcohol to certain citizens who are capable of consuming

large doses. The basis of these differences is provided by a locus-block of genes that form the ferment of alcohol dehydrogenation. One finds people in whom this locus is completely lacking and because of this they cannot take even a minimum—up to a couple of grams—quantity of alcohol. Thus the differences in people's reaction to the consumption of alcohol are genetic in nature.

In the second place, it has been proved that alcohol and products of its disintegration (acetaldehyde) disturb the biosynthesis of protein at the level where the RNA is still being formed (transcription) and at the level of translation (the assembly of protein at the matrix of the RNA).

In the third place, alcohol and its derivatives, even in small doses, can violate the integrity of the chromosomes, that is, cause chromosome restructuring and this means that it can be the cause of deformity in the offspring.

In the fourth place, alcoholic beverages in their current variety should be regarded as complex mixtures whose components, in addition to ethanol, are various alcohols, aldehydes and ethers; it also includes fusel oil and other organic and inorganic substances that are also capable of having a negative effect on the exchange of substances in the organism.

The consumption of alcohol by pregnant women has especially difficult consequences—stillbirths, premature deliveries, the death of children in the first weeks of their life, various birth defects or serious, frequently irreversible intrauterine infections of the central nervous system (various forms of alcohol embryopathy). Alcohol is regarded as the most important harmful factor that acts on the fetus both directly and indirectly.

It should be noted that a complete picture of the disease does not develop in all children with embryonic "alcohol syndrome," that is, not all of the known deviations can be found in a single child. Substantial data from a number of countries show most frequently disturbances of the overall development, reduction of the weight of the newborn, changes in the nervous system and deterioration of the mental development of the children. But the main difficulty of embryonic "alcohol syndrome" lies in the psyche and the intellectual development.

The fate of children with severe "alcohol syndrome" depends mainly on the degree of damage to the nervous system. Scientists note that more than 50 percent of patients have delayed psychomotor development, regardless of the conditions in which they live during childhood. It is important to note that the intensiveness of the "alcohol syndrome" depends on the dose of alcohol consumed by the mother during the first months of pregnancy, on the level of the maternal blood alcohol, and on the stage of the mother's alcoholism.

Recently the world has been alarmed by the fatal influence of alcoholic beverages on the heredity and health of future generations. In many countries, including ours, the fight against alcoholism has been raised to the rank of state policy and science is doing everything possible to help in this.

A special international symposium held in 1975 was devoted to the "alcohol syndrome." (Footnote 3) Convincing facts were adduced by Dr Hanson who discussed the results of research in the State of Washington on 1,529 mothers and their children. It turned out that for mothers who did not consume alcoholic beverages at all or consumed them in small quantities, 2 percent of the children are born with deviations from the norm (extra fingers and toes, anomalous folds of skin on their palms, crossed eyes, low-set ears, congenital heart defects, and so forth). This figure increased to 9 percent in people who drink moderately and to 70 percent in people who drink heavily. In the last category, as a rule, they registered not one but several deviations from the norm. The doctors were bothered most by the fact that in 12 percent of the children born of alcoholic mothers the size of the head was significantly smaller than the norm. This usually indicates the child's mental backwardness. It was noted that in the group of the women who did not drink at all or who drank moderately, this phenomenon is encountered in one-tenth the number of cases that are found in the other group.

Refrain From Harmful Habits!

A couple of words about "harmless coffee." A cup of hot coffee, even decaffeinated, stimulates the secretion of gastric juice and, naturally, irritates the stomach lining. But this is far from all. In the United States, for example, during the past 30 years there has been a sharp increase in cancer of the pancreas. Previously it was thought that the consumption of alcoholic beverages and smoking were possible causes of this disease, but now medical experts give one more cause—coffee consumption. Research has shown that there is no connection between the consumption of alcohol and cancer of the pancreas, but there is a correlation between the consumption of coffee and the appearance of cancer of the pancreas. Precise observations have shown that the consumption of no less than two cups of coffee a day increases the danger of cancer by a factor of 1.8, and 3 and more—by a factor of almost 3! As concerns smoking, its harm is so obvious that the fight against it has become the concern not only of scientists, but in a number of countries it has been raised to the rank of state policy. Nonetheless, few people know that smoking causes immense harm to the future generation as well. Precise cytogenetic research has shown that smoking (even if it is not intensive) considerably increases the sterility of men and women, reduces the weight of newborn children, increases the percentage of embryonic fatality and the number of stillborn. And yet all this can be avoided by abandoning this harmful habit....

Why Are We Ill?

We know of a group of inherited diseases whose causes are the existence in the human genotype of genes that cause them. But this group of diseases is small and comprises approximately 6-8 percent of the overall diseases of the population. One encounters more frequently diseases with hereditary predispositions (90-92 percent): arteriosclerosis, gastric and duodenal ulcers, diabetes, rheumatism, schizophrenia, and genetic developmental defects. In these cases the predisposition or the "sensitivity" to a certain disease is passed on from one generation to the next.

But the appearance of a disease with a hereditary predisposition depends not only on the genotype, but also on factors in the external environment. They include the location where the person lives—a city or village, the smoke and gas pollution, noise; nutrition—the frequency of meals, their diversity, their quality and quantity; the sphere of activity—hard mental or physical work, peaceful work, or that which brings satisfaction or causes irritation; and finally, harmful habits which we have already discussed. All these factors should undoubtedly be taken into account when preventing diseases with hereditary predisposition. After all it is known that hereditary predisposition, for ulcers, still does not mean that they will appear: most frequently this happens when the person does not eat regularly, smokes, or consumes alcoholic beverages.

Today the medical-genetic services coming to the idea of the need of creating, in addition to the ordinary outpatient record, a special chart—a genetic register. (Footnote 4) It would obtain objective, constantly augmented data about individuals with genetic anomalies, from which it would be possible to judge the degree of genetic risk. Scientists think that the utilization of a genetic register would facilitate the application of various preventive measures and make it possible to keep track of their effectiveness. A genetic register is also useful when planning material means for patients (therapeutic, pension support, and the maintenance of nursing homes for children and adults). The register is especially useful for the genetic physician when consulting with youth who are about to be married.

But what if the family has already been created and the young woman is expecting a child? It cannot be ruled out that these registers would disclose the genetic incompatibility of the couple. The method of amniocentesis could verify the supposition. With the help of this method it is possible to identify about 100 genetic and practically all chromosomal deviations that affect the developing embryo (during the period up to the 16th week of pregnancy). For analysis one uses the amniotic fluid and the fetal cells located in it.

Amniocentesis is a labor-intensive and costly procedure. But U.S. economists have determined that the cost of analysis for 900 women is much less than the cost of

forced hospitalization of one patient, which costs more than \$100,000. Each year about 4,000 children are born in the United States with hereditary diseases and their hospitalization costs \$1.5 billion a year.

In our country medical-genetic consultation have been opened up in Moscow, Leningrad, Kiev, Donetsk, Minsk, Alma-Ata, Tashkent, Frunze, Ashkhabad, Riga, Vilnius, Tartu, Yerevan, Kishinev, Kemerovo, Novosibirsk, and other cities. An analysis of the operation of such a consultation point at the Moscow Institute of Medical Genetics of the USSR Academy of Medical Sciences showed that during 1973-1974 ill children were born to 77 percent of the families who came for help. If they had come for consultation earlier this misfortune would not have taken place.

The birth of an ill child not only can but must be prevented. But would should be done in the event that one is born? How does one conduct early diagnosis of the heredity disease in a newborn child if it is not clear what the deviations from the norm were at the time of the regular examination? In this case the medical-genetic service offers a number of screening methods. In a number of countries 8-20 percent of the hereditary diseases of young people are subject to screening.

The scientific and technical revolution, by expanding the sphere of human activity, has set a new task for medical genetics—to determine the optimal environmental conditions for a particular genotype, since many occupational diseases have a genetic predisposition. And today we know of more than 3,000 occupational diseases! Moreover, it has turned out that a description of the genotype is necessary not only for preventing occupational diseases, but also for treating patients. For example, not everyone can take aspirin, sulfadimidine or many other medicines in their usual therapeutic doses since taking them even once can cause serious complications.

As we can see, medical genetics is faced with important and broad tasks. But it is not only the specialists who must resolve them. Each of us is responsible for his own health and the health of his offspring, and therefore it is necessary to do everything possible to strengthen it.

Footnotes

1. USSR Central Statistical Administration. The number and composition of the USSR population according to the 1979 All-Union Census, Moscow, "Finansy i statistika", 1985, p 219.

2. At the present time the average age of a bride in the country is 24.

3. For more detail about the symposium see Tarasenko, N. D. and Lushanov, T. I., "Chto vy znayete o svoey nasledstvennosti?" [What Do You Know About Your Heredity], Novosibirsk, "Nauka", 1980.

4. For more detail see works of the International Genetics Congress, Moscow, 1978.

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The Experiment

18200222o Novosibirsk *EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA (EKO)* in Russian No 7, Jul 87 pp 189-190

[Article by B. Shmakov: "The Experiment"]

[Text] An associate of one scientific research institute, V. Nonsmoker, looked at the documentation for the last time and shuddered inside. The experiment set up for tomorrow was to prove the possibility of a sharp increase in labor productivity at the institute.

At that time, a month ago, when discussing the plan of the experiment with the management, V. Nonsmoker stood up and said quietly: "Allow me to experiment on myself."

...The time passed in intensive preparation. The associates cast excited glances at their colleague and the professional group organizer in each case wrote down the addresses of his near and distant relatives. The state insurance inspector also offered his services.

V. Nonsmoker's wife and children did not sleep the night before the experiment. And in the morning, having promised his sobbing wife to stop the experiment in the event of extreme danger, he hurried to the institute.

At 9 am, V. Nonsmoker was led into a special box and sat down at a desk which was an exact replica of his own workplace. A sign lit up: "Experiment in Progress—45 Minutes Without a Cigarette." The commission of experts clung to the indicators, registering the movement of the subject and the indications on the instruments. The experiment had begun.

Brief lines from V. Nonsmoker's personal diary convey all the trauma of the scientific event:

9:03. A good mood. A little out of sorts because of the early arrival at work.

9:07. I feel a certain desire to discuss the latest news with my colleagues. A habit that I have acquired over the years is making itself known, I would like a cigarette.

9:12. I am making my first attempt to begin work, which leads to a slight dizziness and nausea. I have a tormenting desire to smoke. I shall try to distract myself with ideas about forces and nicotine.

9:18. It has passed. I pick up the phone to ask Nina if her husband had brought anything good to eat from his business trip. But the telephone has been turned off in keeping with the conditions of the experiment. They say that there are entire nations who do not smoke while working, but just work. Interesting!

9:25. I am making my second attempt to start to work. But something deeply personal will not allow me to do this. Now, if only I had a crossword puzzle! But they took it away when I entered the box....

9:27. My ears are beginning to swell.

9:29. Finally I have begun to draw up the report for the third quarter. It turns out that I have forgotten certain letters of the alphabet. It is tormenting to recall them. Emblazoned on the sign are the words: "Pressure and pulse have increased. Halt this part of the experiment."

9:32. It has not stopped. I just remembered something. I am trying to use words that consist of letters which I do know. No problem, it is working.... Our department can win a prize position again.

9:38. Signs of obvious fatigue have appeared. I remembered my wife and pushed on the button with the inscription: "I am halting the experiment." "Hold on, Vasily!" The muffled voices of my colleagues reach me.... With an effort of will I stop myself. Another 7 minutes and my career—in the good sense of this word—is ensured.

9:45. The commission of experts and associates with shouts of rejoicing took V. Nonsmoker into the corner and rocked for a long time. Having finally torn himself out of the embraces of his friends and greedily reached for a cigarette, the happy V. Nonsmoker said: "It is difficult, but possible!"

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Laws of Organization and Management Reviewed
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pp 190-191

[Phrases gathered, rephrased and also new ones formulated by K. Arasplanov: "On the Laws of Organization and Management"]

[Text] 1. The Law of the Need for Organization. Everything bad comes of its own accord but everything good must be organized.

2. The Law of the Relationship Between Management and Organization. Management is organized but the organization is managed.

3. The Kerzhentsev (Footnote 1) Law of Self-Organization. In order to organize others, organize yourself.

4. The Gastev (Footnote 1) Law on the Relationship Between Knowledge and Ability. A person who has knowledge but not ability is a mechanism without an engine.

5. The Personnel Law. Personnel decide anything if they decide.

6. The Tsunami Law. Tsunamis come and go, but accountability remains.

7. The Law of Pearls. From pearls alone one only gets pearl mush.

8. The Law of Mush. I, you, he, she—these are the leaders, but who will cook the mush?

9. The Law of the Radish. The freshness of the radish is inversely proportional to the number of units participating in its harvest, transportation, and sale.

10. The Law of Reliability of Organization. The reliability of an organization is inversely proportional to the number of its units and the mass of management instructions.

11. The confession of a cunning manager. In order to reveal reserves, first they must be concealed.

Footnote

1. P. M. Kerzhentsev and A. K. Gastev were outstanding figures in the scientific organization of labor during the 1920's and 1930's.

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